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See also page xxxvi.

No. 6.—Vol. 16.
December, 1895.

The Practical Teacher

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CONTENTS.

	PAGE
Well-known Teachers at Work.' XLV.—Mr. Andrew Comrie, M.A. With Portrait	279
Is it Desirable to have Lady Members of Parliament?' A Humorous Debate for Boys. By Joseph Despicht	283
Composition Stories.—Standard V. and 1st Year P.T.'s	287
Reading Tests.—Standard III.	288
Dictation Tests.—Standard IV.	289
and Code Queries Column ...	291
—'When Summer Joys are O'er'	292
1896 Certificate Class. By J. C. Horobin, M.A.	293
and Notions. By Richard Waddington	297
Mental Arithmetic for the Standards. By T. B. Ellery, F.R.G.S. ... 299,	308
Music—"The Practical Teacher" Waltz'	300
Our Pupil Teachers' and Scholarship Course. By Arthur T. Flux	309
Elementary Practical Chemistry. By Thomas Cartwright, B.A., B.Sc. (Lond.) ...	314
Royal Commission on Secondary Education. By Thomas Cartwright	316
Teachers' Drawing Lessons. By E. Buffery Ridge	319
Elementary Lessons in Agricultural Zoology. By Professor J. R. Green, Sc.D., F.R.S., and F. L. Green...	321
Science Notes	322
Chemistry Notes. By W. Tate, A.R.C.S., F.C.S.	323
Magnetism and Electricity. By Edwin Edser, A.R.C.S....	324
Organic Chemistry Notes. By J. T. Hewitt, M.A., D.Sc., Ph.D.	326
Notes on Physiology. By Walker Overend, M.A., M.D. (Oxon.), B.Sc. (Lond.) ...	327
Fine Art Productions...	331
Bradford School Board	332
Prize Books	332
Reviews	335

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Wisdom is humble that he knows no more.'—COWPER.

VOL. XVI. No. 6. DECEMBER, 1895. { PRICE, 6D. / POST FREE, 8D.

WELL-KNOWN TEACHERS AT WORK.

XLV.—MR. ANDREW COMRIE, M.A.

Headmaster West Burgh School, Forfar, N.B.

THE West Burgh School of Forfar is an intensely interesting field of new arrangements and fresh combinations. Fertile brains have been at work on it. The ever-widening vantage ground furnishes scope for yet further development and advance.

To this educational centre all the pupils attending the elementary schools in Forfar are drafted when they have passed Standard V. The energetic School Board of the burgh is to be congratulated on this decidedly popular and practical step. Results are proving the incalculable importance of the arrangement to the pupils in the higher standards (VI. and Ex-VI.).

It is high time that School Boards and Managers all over the country should seriously consider the position of the pupils in the higher standards. Possibly the Inspector who states that 'the pupils in Ex-VI. are, as a rule, practically wasting their time in many of the elementary schools,' may have made an oversweeping charge. Our experience is that in too many cases the charge would hold good. Unquestionably more definite and systematic teaching should be provided for these pupils.

The teachers' difficulties in handling these classes are *real*, and cannot be minimised without additional staff. Additional staff involves expenditure out of proportion with the size of the school or the number of pupils in these particular classes.

In Forfar the *central class* remedy is applied, and with complete success.

The isolation of elementary education is a thing of the past. The doctrine of *Relativity* is moulding modern educational arrangements to a large extent. Education, elementary, higher, and technical, is now treated largely as an organic whole. Verbal and mythical distinctions are vanishing. Purely elementary schools have never commended themselves to Scotch tastes. Tolerated they are, but the deep-rooted love for a liberal education, so characteristic of Scotch character, is slowly remodelling the elementary schools. By adding secondary departments, technical classes, higher subjects, and most effectively, as we think, by placing University trained teachers *in* these schools, Scotland is realising her ideal school—a school where all the branches necessary for commercial, industrial, or University life are taught.

The early days of School Boards were marked by innumerable errors. The planting of many *small schools* in some very injudiciously selected centres is an outstanding educational blunder. It has involved the moderns in no end of trouble. The mere fragments of classes presented in Standards VI. and Ex-VI. in many of our schools is painful to see. We refer, of course, to small towns and populous country districts. Country schools in thinly populated parishes are quite exceptional. Boards, unwilling 'to pull down their barns and build greater,' are treating the small schools as ONE educational institution for the locality, merging all the higher standards into one selected centre for the colony. Over this centre they place a University graduate, who carries on the higher work in tolerably large classes.

In making educational experiments, results hinge largely on the conditions under which the experiment is carried out. The Forfar Board evidently kept this in view, and recognising that the prime requisite for success was a first-class educational pilot, they selected Mr. Comrie, a distinguished graduate of Glasgow University. Into his hands they put the education of all the VI. and Ex-VI. pupils of the burgh.

Mr. Comrie's record as pupil teacher in West Public School, Paisley; as student in Glasgow University and in the Technical College; as Assistant for six years in the same school in which he served his apprenticeship; as Headmaster of Corbrook Street School, Paisley (where the grant rose 5s. per head within the *two* years during which he had charge); and finally as Headmaster of the West Burgh School, is one of uniform excellence. A glance at this record may interest our readers. We shall confine ourselves to official notices and reports.

WEST BURGH PUBLIC SCHOOL, FORFAR.

TIME TABLE.

Day.	9—9.30	9.30—10	10—10.5	10.5—11	11—11.15	11.15—12.15	12.15—1	1—2	2—2.5	2.5—3	3—4
Monday	Opening Exercises and Religious Instruction	St. II. Spelling St. III. Spelling St. IV. Spelling St. V. Spelling St. VI. (B.) Grammar St. VI. (G.) Dom. Econ. Ex-VI. (B.) Euclid Ex-VI. (G.) Dom. Econ.	Marking Registers	St. II. Reading & Intelligence St. III. Grammar 10.5—10.30 St. IV. Drill (B.) 10.30—11 St. V. Sewing (G.) 10.30—11 St. VI. (B.) Drill, Poetry St. VI. (G.) Composition Ex-VI. (B.) Drill 10.5—10.30; French 10.30—11 Ex-VI. (G.) French	Interval	St. II. (G.) Sewing, (B.) Arith. St. III. Reading, Intel., Poetry St. IV. History, Geography St. V. Reading, Intel., Poetry St. VI. (B.) Read., Intel., Poetry St. VI. (G.) Read., Intel., Poetry Ex-VI. English Classic; Gram.	St. II. Hist. & Geog. Read. St. III. History, Geography St. IV. Read., Intel., Poetry St. V. History & Geography St. VI. (B.) Latin St. VI. (G.) History, Geog. Ex-VI. History, Geography	Interval	Marking Registers	Arithmetic Ex-VI. (B.) Algebra Ex-VI. (G.) Sewing	St. II. Writing St. III. Writing St. IV. Writing St. V. Composition St. VI. (B.) Composition St. VI. (G.) Sewing Ex-VI. (B.) Latin, (G.) Com.
Tuesday		Ditto		Drawing (B.) Sewing (G.) Ex-VI. French		St. II. Reading and Intelligence St. III. Spelling (Slate) St. IV. Grammar St. V. Grammar St. VI. (B.) Hist. & Geo. Reader St. VI. (G.) Hist. & Geo. Reader Ex-VI. English Classic; Gram.	St. II. Grammar, Poetry St. III. Hist. & Geog., Read. St. IV. Hist. & Geog., Read. St. V. Hist. & Geog., Read. St. VI. (B.) Latin St. VI. (G.) Grammar, Spell. Ex-VI. Arithmetic (Revision)			Arithmetic Ex-VI. (B.) Composition Ex-VI. (G.) Sewing	St. II. Writing (Dictation) St. III. Writing (Dictation) St. IV. Writing (Dictation) St. V. Writing (Dictation) St. VI. (B.) Writing Dictat.) St. VI. (G.) Writing (Dictat.) Ex-VI. (B.) Latin, (G.) Frch.
Wednesday		Ditto		St. II. Reading, Intelligence St. III. Grammar St. IV. Grammar St. V. Grammar St. VI. (B.) History, Geography St. VI. (G.) Composition Ex-VI. French		St. II. Grammar, Poetry St. III. Reading, Intel., Poetry St. IV. (G.) Sewing, (B.) Dict. St. V. Reading, Intel., Poetry St. VI. (B.) Read., Intel., Poetry St. VI. (G.) Read., Intel., Poetry Ex-VI. English Classic; Gram.	St. II. Hist. & Geog. Read. St. III. Sewing (G.), Dict. (B.) St. IV. Reading, Intel., Poet. St. V. Sewing (G.), Arith. (B.) St. VI. (B.) Latin St. VI. (G.) History, Geog. Ex-VI. History, Geography			Same as Monday	Same as Monday
Thursday		Ditto		Same as Tuesday		Same as Tuesday	Same as Tuesday			Same as Tuesday	Same as Tuesday
Friday		Ditto		Same as Monday		Same as Monday Ex-VI. French (Rev.)	St. II. History, Geography St. III. History, Geography St. IV. Read., Intel., Poetry St. V. History, Geography St. VI. (B.) Latin St. VI. (G.) Grammar, Spell. Ex-VI. Composition (B. B.)			Same as Monday	St. II. Composition St. III. Composition St. IV. Composition St. V. Composition St. VI. (B.) Composition St. VI. (G.) Sewing Ex-VI. (B.) Latin, (G.) Com.

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WEST BURGH PUBLIC SCHOOL, FORFAR.

TIME TABLE.

INFANT DEPARTMENT.

Day.	Class.	9—9.30.	9.30—9.50.	9.50—10.	10—10.40.	10.40—11.	11—11.15.	11.15—12.	12—12.20.	12.20—1.	1—2.	2—2.10.	2.10—2.40.	2.40—3.	3—3.45.	3.45—4.
Monday.	1	Bible	Spelling		Reading	Writing		Hist. & Geog.	Object Lesson	Sewing (G.) Writing (B.)			Reading	Writing	Arithmetic	
	2	—	Bible		Reading	Writing		Object Lesson and Singing	Games	Sewing (G.) Writing (B.)			Reading	Writing	Arithmetic	Home Work and Dismissal
	3	—	Bible		Reading	Writing		Object Lesson and Singing	Games	Sewing (G.) Writing (B.)			Reading	Writing	Arithmetic	
Tuesday.	1	Spelling	Recitation		Drawing	Drawing		Reading	Sewing (G.) Writing (B.)	Sewing (G.) Writing (B.)			Reading	Composition	Arithmetic	
	2	—	Arithmetic		Reading	Writing		Kindergarten and Singing	Drill	Sewing (G.) Writing (B.)			Reading	Word Building	Arithmetic	Home Work and Dismissal
	3	—	Arithmetic		Reading	Writing		Kindergarten and Singing	Drill	Sewing (G.) Writing (B.)			Reading	Word Building	History & Drill	
Wednesday.	1	Bible	Spelling		Reading	Writing			Kindergarten	Sewing (G.) Writing (B.)			Reading	Writing	History & Drill	
	2	—	Bible		Reading	Writing		Same as Monday	Recitation	Sewing (G.) Writing (B.)			Reading	Writing	History & Drill	Home Work and Dismissal
	3	—	Bible		Reading	Writing			Recitation	Sewing (G.) Writing (B.)			Reading	Writing	History & Drill	
Thursday.	1	Recitation	Spelling		Drawing	Drawing			Object Lesson	Sewing (G.) Writing (B.)			Reading	Writing	History & Drill	
	2	—	History		Reading	Writing		Same as Monday	Drill	Sewing (G.) Writing (B.)			Reading	Writing	History & Drill	Home Work and Dismissal
	3	—	Arithmetic		Reading	Writing			Sewing (G.) Writing (B.)	Sewing (G.) Writing (B.)			Reading	Writing	History & Drill	
Friday.	1	Bible	Drill		Reading	Writing			Sewing (G.) Writing (B.)	Sewing (G.) Writing (B.)			Reading		History & Drill	
	2	—	Bible		Reading	Writing		Same as Tuesday	Games	Sewing (G.) Writing (B.)			Reading	Same as Tuesday	History & Drill	Home Work and Dismissal
	3	—	Bible		Reading	Writing			Games	Sewing (G.) Writing (B.)			Reading		History & Drill	

As a student—

I. In Glasgow University we find Mr. Comrie figures on the (1) *Bursary List*, holding the Lorimer Bursary in Mental Philosophy open to students of the third year, value £25 for three years; and Duncan Wright Bursary, open to *Arts students* of Paisley, value £25 for four years.

(2) *Prize List*:—

Greek Class (Senior)	V.	Prize.
Logic „ „	III.	„
English Lit. (Junior)	VII.	„
Moral Philosophy	VI.	„

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1888—'Mr. Comrie is a teacher of marked ability and promise.'

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Reports on Corbrook School, Paisley:—

1892—'There is a marked improvement in the condition of the school since Mr. Comrie took charge, especially in the Senior Department, where there is a distinct advance in the accuracy and neatness of the written work, in the general intelligence and order and discipline. The Class subjects are all very good.'

1893—'The school is conducted by Mr. Comrie with much ability, earnestness, and success, and, especially in view of the way in which the work is hampered by the nature of the accommodation, is in a highly creditable condition.'

In 1894 Mr. Comrie came to Forfar. The West Burgh School was under a cloud, and required an enthusiastic and skilled head. Knowing the previous history of the school, we were delighted to hear from outsiders that 'the darkness had passed almost entirely,' and that the school had a just claim to be 'recognised as a model school' in Kindergarten, Industrial, Elementary, and Higher Class work among the advanced standards.

We shall hear the Inspector:—

1894—'The new Headmaster has made a decidedly good impression in the tone and discipline of the school during the short time he has been in charge.'

1895—'The school is now in excellent condition, and continues to rise in efficiency. A decidedly good appearance is made by Ex-VI. pupils in the first and second stages of Mathematics, French, Latin, and Domestic Economy: The Physical Drill of the boys is performed with promptness and precision.'

We did not conceal from Mr. Comrie that we were disposed to criticise the 'University Man,' and to discover whether he was, according to a contemporary, a '*rara avis*' with 'cloudland leanings' and 'Higher Education fads,' quite out of his element in an elementary school. Mr. Comrie met us frankly, explained his methods, pointed to results, and manifested no *undue* leanings to 'subjects specially sympathetic to University tastes.' Further, the hearty testimony borne to the deep interest which he manifests in everything connected with the Kindergarten and Industrial departments by the teachers presiding over these was sufficient proof of his capacity for guiding the complex machinery of a *mixed* school. The practical training of girls in Domestic Economy and Industrial branches, and the all-important work of the Infant mistress, receive their full share of attention from the Headmaster. The undisputed success of these departments is largely attributed by the teachers to the scope, encouragement, and facilities afforded them by Mr. Comrie. The loyal testimony of these teachers proved that Mr. Comrie interests himself in subjects not found in the 'Academical category of a University.'

The truth is 'the University man' is the *broad*-cultured man who is commending himself daily to School Boards grappling energetically with modern educational problems. An infusion of University culture into our school staff would undoubtedly bring up the whole of our national system of education to a high level, and render it more potent as a social lever for intellectual and moral purposes. Revolutionary factors are present in this school, but so kept in check and yoked to the ordinary work, that the renovating and developing influences work smoothly and quietly, the effect being a high-pitched training of a specially practical and solid order. Personally we have great hopes for a school where *foundation work* is specially attended to, and Mr. Comrie is clearly a master here.

Stimulating agencies abound. The Headmaster presents annually two silver medals to Standard V., and the same number to Standard Ex-VI. The names of the medallists are inscribed on the *Medallists' Board* in the Senior Department.

Mr. Comrie's efforts in this direction are backed up by several members of his Board, who present valuable prizes. The Edinburgh Angus Club give substantial aid in the laudable work of encouraging deserving pupils, by presenting handsome prizes annually.

Mr. Comrie has a regular system of *marking* in all his classes. The marks are totalled weekly, and places given to pupils according to marks obtained. For neatness in work special marks are given. The system of writing throughout the school is McDougall's 'Upright.'

In Geography much use is made of pictorial advertisements published by railway and steamboat companies.

The Discipline or Moral Code is brief but definite. Being firmly enforced, it is better than a long tabulated series of rigid directions got up for exhibition purposes.

In English the pupils are introduced to Shakespeare's plays. 'The general intelligence of these classes' (says the Inspector) 'is satisfactory. They have a commendable knowledge of Grammar, History, and Geography.'

Code requirements, school drill, and the formal lesson elements are all here, but touched up and pervaded with such a glow and life of decidedly Higher Education that must tell on the senior pupils. Mr. Comrie's work in these advanced classes serves as a solid basis for future study, and for stimulating to more extended investigation in the walks of Litera-

ture, Science, and Art. We quite endorse the opinion of one interested in the school, that it is 'a most substantial link between the schools of Forfar and the University.'

The range of study for all the classes is definitely fixed by the Headmaster, but perfect freedom as to method is allowed to the assisting teachers, and all are provided with the essential appliances on a pretty liberal scale. The whole school is one symmetrical edifice of perfect organisation. Mr. Comrie has a high ideal before his eye. He is proceeding tentatively—keeping his eye on the weak points, raising section after section to the Inspector's degree of *Excellence*, and alive to all the advancing and widening ideas and movements of the educational world.

His system of dealing with Spelling is unique. Lists are collected from the teachers of words misspelled. These are taken by the pupil teacher to the printing room (the Master's room meantime) and printed off, circulated among the pupils, and thoroughly revised. Failure in spelling under the system is impossible. It is the most thorough and effective method of attaining perfection in this 'troublesome art' that we have met with. No spelling lists can compare with those got up on the spot and growing out of the regular work of the pupils. We were deeply interested in this subject, and we commend it to the attention of our readers. It is only one of the many intelligent artifices and arrangements of scholarship and craftsmanship which abound in the school.

Our notes are simply an *index* of what may be seen here, not exhaustive descriptions certainly.

Map drawing is admirable. The specimens of specially well executed maps are exhibited as incentives to the pupils' exertions. Bad maps are also shown with the faults carefully particularised and emphasised.

Singing is also to the front. Report says, 'Singing from notes and in parts was of exceptionally good tone and merit.'

Mr. Comrie is a member of the Forfarshire Branch of the Educational Institute of Scotland. He takes a deep interest in all that concerns his profession. We are deeply indebted to him for many valuable hints on Technical and Higher Education. We shall hope to see him at no distant date presiding over one of our largest schools, where his Technical and Agricultural schemes of study can be brought into play along with the higher branches. We left the West Burgh School feeling that we had come into contact with a Teacher who believes that children are not '*stamped* like coins,' but that they 'grow like plants,' and who adapts his methods accordingly.

Yours faithfully,
Andrew Comrie

'IS IT DESIRABLE TO HAVE LADY MEMBERS OF PARLIAMENT?'

A HUMOROUS DEBATE FOR BOYS.

BY JOSEPH DESPICHT.

(*Time in performance*—30 *minutes.*)

For directions as to platform, dresses, etc., see 'PRACTICAL TEACHER' for July 1895.

Time—First night after a General Election.

Place—The House of Commons.

MR. SPEAKER.
(Loud cheers as he rises.)

MY lords and gentlemen, allow me to congratulate you most heartily on your reappearance in this historic House. Some of you—I will not mention names—had, at the late elections, but a very narrow escape from being left out in the cold. (A laugh.) While it is extremely pleasant to meet again so many familiar faces, it is also rather painful to me to see so many gaps among the parliamentary lights, caused by the political extinction of some of my old and distinguished friends. (Hear, hear!)

I was in hopes of having the honour of introducing to this august assembly the first 'Lady Member' (Hear, hear!), but that very unsusceptible Returning Officer would not even allow one to be nominated. (Shame!) Still, when she does come, as come she will, we shall all be very glad to see her. (Loud cheers.)

But putting aside all compliment, let us proceed to business. (Hear, hear!)

To save precious time, and as our loyalty goes without saying, the Address to the Crown is, in this Session, to be omitted. We may, therefore, proceed at once to the Order of the Day. (Hear, hear!)

I find the first notice on the paper is a motion to be moved by our Grand Old Minister, on the very question of Lady Members of Parliament; and with the simple reminder that the eyes of the whole nation are upon you, and that England expects every man to do his duty, I call upon the Leader of the House to begin. (Loud cheers.)

1ST SPEAKER, R.* (Loud cheers as he rises.)

Sir, allow me, first, as Leader of the House, to reciprocate, on my own part, and also on the part, I am sure, of every Member of this Parliament, the generous and sympathetic sentiments you have expressed towards us. (Cheers.) We feel it a privilege, and an immense one, to be called upon by our country to assist in the framing of her laws, under the guidance of one so able, so impartial, so gifted as yourself! (Hear, hear!) Old and young, veteran and

* 'R.' and 'L.' signify Right and Left of chair.

raw recruit, offer you, and through you, the country itself, their most respectful homage! (All rise and bow to the Chair.)

Now, it is with something like fear and trembling that I rise to submit the motion attached to my name on the notice paper. It is, 'That in the opinion of this House it is *not* desirable to have Lady Members of Parliament!' (Hear, hear! No, no! Speaker rings bell.)

A long and arduous life, spent in the service of my country, has convinced me that women are physically and intellectually unfit for the parliamentary arena! (Hear, hear! No, no!)

Abstract and negative propositions I, as a rule, carefully avoid; but any man with his eyes open but fairly wide can see that the vista, at the end of which stands this question in a practical form, is not a long one! (Hear, hear!) And, therefore, I think it advisable for us to educate the country at once on this matter! (Hear, hear!)

Now, I say first, that women are physically unfit for Parliament! Some of you know—though some of you do not, but you very soon will—the amount of bodily strength required to sit through a whole night listening to wordy debates that probably begin in the clouds, and are destined to end in smoke! (Hear, hear!) Gentlemen from across the water have marvellous powers of talking the night away! Would you have any lady of your acquaintance condemned to listen? (No, no! on Right.) Their weak frames would, I believe, collapse under the torture! (Hear, hear! and laughter.)

And, intellectually, too, I believe women are incapable of legislating for a nation! (Hear, hear! No no!)

They are industrious, if you like—they are ready and apt in acquiring knowledge, if you like—they are, perhaps, the best of linguists! (Hear, hear!) But they are incapable of retaining for a long period vast stores of knowledge; they are incapable of beating and refining that knowledge sufficiently to get from it the pure gold of Universal Truth! (Hear, hear!) The measure of an intellect is the measure of its power of concentrating itself on one thing at a time; and, tested by this, woman's intellect has always proved inferior to man's! (Hear, hear!)

She can manage, it has been said, but she cannot organise; and, therefore, again, I say, she is intellectually and physically unsuited to assist in the government of a vast Empire like ours! (Hear, hear! No, no! and cheers.)

2ND SPEAKER, R.

Sir, in rising to second the proposition of the Prime Minister, I must disclaim on my own part, and, I am sure, on his too, the least desire to place *any blame whatever* on the ladies for their want either of great physical strength, or of the highest form of intellect! (Hear, hear! on Right.) On the contrary, we are glad to recognise that, *in her own sphere*, woman far outshines man! (Hear, hear!) She is more loving, she is more tender, she is more full of heart, if I may use the term, than her stronger-brained companion, man! But then, she must keep in her sphere! (Hear, hear! and Oh, oh!) If once she quit it and enter man's sphere, goodbye to domestic comfort, goodbye to the charm of home, goodbye to all the manly deference shown her. (Hear, hear!) Those in the arena *must fight there!* And sad will be the day for you and for me, aye, and for our dear, dear country, when, amidst the dust and din of party strife, shall be heard the strident voice of woman, once silvery, now brazen, hounding on to further conflict! (Hear, hear! Oh, oh!—bell.)

3RD SPEAKER, L. (After a slight pause.)

Mr. Speaker, if no one else will rise to champion the ladies, I will! (Hear, hear! Bravo!)

I am naturally of a modest and retiring disposition, but I must, for once, throw aside my usual bashfulness, and take up arms in defence of the softer sex. (Bravo! bravo!)

Now the Head of the Government has said that ladies are physically incapable of performing the duties of Members of Parliament, because they could not endure the fatigue of sitting through long and dreary debates. (Hear, hear! on Right.)

Well, first of all, I deny the fact on which he bases his argument. Women are *not* the poor weak creatures he would have us suppose. (Hear, hear!) Is a night at a prolonged debate more taxing to the strength than a night of watching beside a sick bed? (No, no! on Left.) Let a man try the amount of energy required for a few nights' watching and nursing, and he will soon come to the conclusion that though a woman's strength is different *in kind* to a man's, yet it is, in the long run, far more enduring. (Hear, hear! and No, no!)

But supposing, for the sake of argument, that women *are* too weak to endure our long and dreary debates, we should shorten and enliven the debates—not exclude the ladies. (Hear, hear! Bravo!)

4TH SPEAKER, L.

Mr. Speaker, I was about to rise when my impetuous friend managed to catch your eye!

I assure you, sir, that it was not from any want of spirit that I paused before rising: it was simply to put myself in a proper state of mind before giving vent to the indignation I feel at the address of the mover of the resolution. (Cheers on left.)

What man that has a mother—what man that has a sister—what man that has a—a—(Cries of 'Go on') a—a—feminine friend—(Hear, hear!) can sit quietly and hear with patience the disparaging remarks of the Opener concerning those he loves best? (Shame! shame! on Left.)

The speaker on my right has completely disposed of one half of the Prime Minister's arguments; I will quickly shatter the other half! (Oh, oh!) I confess it always makes my blood boil when I hear of this want of intellect in the ladies! (Hear, hear!) But granting it—granting that the bump of intellect on a woman's head is not so elevated above the surrounding district as that on man's; does it follow that, therefore, she should not be allowed to represent a constituency in Parliament? (No, no!) Let me put it this way. Do members on the other side mean to say that because my intellectual bump, for example, is not so big as the noble lord's on my right—or, because the right hon. baronet's opposite is not so big as the Prime Minister's—that, therefore, the right hon. baronet and I should be prevented from sitting in Parliament? (Laughter.) No man in his senses would say so! (Hear, hear!) The question is, would not the best woman here—when they come—beat into a baby's bonnet box the worst man! I venture to say she would! (Hear, hear! No, no!)

5TH SPEAKER, R.

Sir, the question before us is, I apprehend, a serious one! (Hear, hear!) It is not to be dismissed with a laugh and a shrug of the shoulders, as some gentlemen seem to think. I warn you all that if we wish to retain any share whatever in the management of affairs, we must make an effort, now or never, to keep women from

Parliament! (Hear, hear! and No, no!) For if she once get there, 'All the king's horses and all the king's men, Will never get rid of the ladies again!' (Bravo!) I venture to prophesy that if *one* woman get in, we shall soon have *twenty*, aye, *fifty!* Indeed, I go so far as to say, that if the women go *in*, the men will very soon go *out!* (Hear, hear! No, no! All attempt to speak. Mr. Speaker says, 'Mr., or Lord So-and-so, has caught my eye.')

6TH SPEAKER, L.

Mr. Speaker, prophesying is, perhaps, the most gratuitous form of error; for I imagine that in a free country a man is not obliged to prophesy against his will! (Hear, hear!)

The right hon. gentleman opposite is very fond of it, and is always *wrong!* (No, no! Hear, hear!) Now is he not treating us ripe old statesmen a little too much like schoolboys, in trying to hold up a bogey before our eyes in the shape of a Lady Member of Parliament? (Hear, hear!) Are the ladies really such monsters that they would frighten all the men away? (No, no!) For my own part—and of course I do not presume to answer for my colleagues—the more ladies are admitted into this House, the more I shall feel inclined to stay! (Hear, hear! and laughter.)

No! The very fact of the ladies being here would rather *attract* than *repel*, and we should have the first of our own sex anxious to make the best possible show before the chosen ones of the other. (Cheers.)

7TH SPEAKER, R.

Sir, if there is any one disaster which the presence of ladies here would cause that is greater than all the rest, it is that straining after effect which the Hon. Member opposite seems to think so much of! (Hear, hear!)

Admit the ladies, and what would follow? Why, every one would be thinking of the *appearance* he was making before them! (Hear, hear!) The question would not be, 'What is best for the country?' but 'What will please the ladies—or a certain lady—best?' (Hear, hear!) Our young and rising men would degenerate into dandies and fops! (Hear, hear!) Everyone would appear with a flower in his buttonhole, and an eyeglass at his eye! (Hear, hear!) Attitude would be everything, and plain, blunt, good old English manners would be nowhere! (Hear, hear!) The men would have to wear swallow-tail coats and acres of shirt front!

3RD SPEAKER (Interrupting.)

Three acres—not to mention the cow! (Chair! Order!)

7TH SPEAKER.

Sir, I must appeal to you to protect me against the remark of the noble lord. I never invented the three acres and a cow phrase! (Hear, hear! on Right.)

3RD SPEAKER.

Perhaps it was three *cows* and an acre you promised!

7TH SPEAKER.

Sir, I must again appeal for protection against these unwarrantable interruptions. (Hear, hear! Withdraw!)

MR. SPEAKER.

I must ask the noble lord to recall his words. (Bravo!)

3RD SPEAKER.

Am I to 'call the cattle home,' or the acres? (Chair!)

MR. SPEAKER.

Both.

3RD SPEAKER.

Certainly! I withdraw the entire remark. (Cheers on Right.)

7TH SPEAKER.

Now, I was pointing out, when I was interrupted by the 'lowing' of the bovine lord—(Hear, hear! on Right)—that the arguments of the Opposition really cut the ground from beneath their own feet; and, by their own showing, the presence of ladies here, by fostering a habit of *attitudinising*, would be a positive injury to the country. (Hear, hear! No, no!—bell, &c.)

8TH SPEAKER, L.

Mr. Speaker, I entirely disagree with the arguments of *both* the last speakers! I do not know how landsmen feel, but we of the briny ocean are considerably flabbergastered under the gaze of the ladies! (Laughter.)

I, myself, would rather have a couple of 'Woolwich infants' pointed at me than a pair of lady's eyes! (Hear, hear!) And if there is one thing in this world that I am really afraid of, it is, I think, a speechifying female! (Hear, hear! and laughter.) I am not used to this sort of thing, you know—talking is not in my line—but I think I have said enough to disprove the argument, that tongues will wag the faster when there are ladies to listen. (Hear, hear!) Now, *I* am going to vote for lady members, because I believe that though they may do a large amount of talking *themselves*, they will, in all probability, stop a deal of it in *others!* (Cheers and laughter on both sides.)

9TH SPEAKER, R.

Sir, having been to Gravesend-on-Sea and back, I know a little about the ocean and seamen myself; and I can quite sympathise with the feelings of the 'sea lord' who has just sat down. But let us return to the more serious and less fanciful objections to Lady Members of Parliament. Supposing we get them here, it will hardly be fair to make them mere 'hewers of wood and drawers of water!' (Hear, hear!) We shall have to give them some of the sweets of office. Imagine, then, a lady First Lord of the Admiralty! (Laughter.) Imagine a lady Minister for War! (Hear, hear!) Or imagine, sir, if you can stretch your imagination to such an unimaginable distance—imagine, I say, you, yourself, having to give place in that chair to your sister, or your cousin, or your aunt! (Loud laughter.)

Then, again, if the ladies claim to be legislators, they must be prepared to become soldiers and sailors, special constables, and regular 'bobbies' themselves! (Hear, hear!) They cannot expect to eat the grapes and leave the men to protect the vines. (Hear, hear!) No, no! If men and women are equal physically and intellectually—if man is Mrs. Gamp, and woman Betsy Prig—we must turn and turn about, and no favour to anyone. (Hear, hear! No, no!—bell.)

10TH SPEAKER, L.

Mr. Speaker, I really do think that the pleasantry of the last speaker was somewhat unjustifiable, for, so far from his arguments being unanswerable, as he seemed to think, I maintain they palpably and visibly contain their own refutation. He says, in his own lofty manner, 'imagine a woman First Lord of the Admiralty or Secretary for War!' (Hear, hear! on Right.) Well, I can imagine a woman more than that. I can imagine a woman Queen of these islands and Empress of India! (Loud cheers.) Did George the Fourth or William the Fourth manage better than Her Majesty Victoria does? (No, no!) I can imagine, too, a woman something more that *Minister* for War. I can imagine one actually fighting! (Hear, hear!) Has the right hon. gentleman opposite ever heard of Joan of Arc? (Hear, hear!) Has he heard of Boadicea? Has he heard of Elizabeth haranguing her troops at Tilbury? (Hear, hear!) Let him call to mind the women of Paris serving the guns during the Franco-German War! (Loud cheers.) Women could and would fight if their country ever needed it; but my irrefutable answer to the Government is this: Get women once into Parliament, and wars will cease. (Hear, hear!) We shall then be able to 'beat our swords into ploughshares, and our spears into pruning hooks. Nation shall not rise against nation, neither shall we learn any more war.' (Hear, hear! and oh, oh! Cheers.)

11TH SPEAKER, R.

Sir, I am a man of peace; and if I thought that the entrance of ladies into Parliament would ensure peace, no one would give them a vote more readily than I should. (Hear, hear!) But I fear that that glorious prophecy from Holy Writ can never have its fulfilment brought about by the means the last speaker has suggested. (Hear, hear!) He has read history very strangely if he thinks that women ever have stopped, or can stop wars. (Hear, hear!) I fear that their rule has, on the whole, tended rather in the opposite direction. No! if wars are to cease, and 'it is a consummation devoutly to be wished,' they must be stopped by the action of men; and I hope we shall not wait till the ladies stop them for us. (Cheers.)

Doctor Johnson, the great authority on everything under the sun, has said that in all countries, savage or civilised, man must rule woman; for it is mind that governs, and when it comes to dry understanding man has the better. (Hear, hear!)

But what I rose for is, chiefly, this. I shall vote against the admission of ladies into Parliament for the sake of the ladies themselves. (Hear, hear!) First of all, I do not believe they want to come. (3rd Speaker—'They do though!') And, secondly, if they do wish it, and succeed, they will find that, in grasping at a shadow of happiness, they have lost the very substance. (Hear, hear!)

Hear what Shakespeare puts into the mouth of a woman, *speaking to women* :—

'I am ashamed that women are so simple
To offer war where they should look for peace ;
Or seek for rule, supremacy, or sway,
When they are bound to serve, love, and obey !'

(Hear, hear ! Bravo ! Order !—bell, &c.)

12TH SPEAKER, L.

Mr. Speaker, I was in hopes that no one in this debate would inflict upon us the opinion of someone who lived hundreds of years ago. (Hear, hear ! on Right.) The sentiments of those dear old fossils were, no doubt, very correct and very proper in centuries passed ; but pray let us move on a bit and study the necessities of the present time. (Hear, hear !) Let us hear no more of your Bedes or your Bacons, your Johnsons or your Shakespeares ! (Hear, hear !) In the House of Commons of to-day we want the *best talkers* we can get. (Hear, hear ! both sides.) Now the question is, 'Who are the best talkers ?' (Cries of 'Women ! Women ! Men ! Men ! and laughter.) I will tell you in some lines of poetry written *after* Shakespeare a long time :—

'Nature, always impartial in her ends,
When she made men the strongest,
In justice then to make amends
Made woman's tongue the longest !'

(Cheers and laughter.)

I shall vote for the ladies ! (Bravo !)

13TH SPEAKER, R.

Sir, all authorities agree that it is *just possible* to have *too much* of a good thing ; and, however charming the eloquence of woman may be, there is the bare possibility—mind, only the possibility—of finding her tongue a little too long. (Hear, hear !) Our debates, instead of lasting all night only, will probably, when the ladies put in an appearance, last all night *and all day !* (Hear, hear !) And so overwhelming will be their flood of talk, that we poor men, 'mute and inglorious,' will not be able to get a word in edgeways. (Hear, hear !)

Still, I am very glad to find that we have wrung one very important confession from the opposite benches. They at least admit that woman is physically weaker than man ; and, therefore, considering the length of the debates—considering the terrible work of electioneering—considering that a Member of Parliament is often expected to do a day's work at the bar and then a night's work in the House—considering, I say, the strength required to perform all these things, and bearing in mind their undoubted want of physique, I strongly recommend the ladies to stop at home and make the *puddings*, while their lords and masters make the *laws !* (Oh, oh ! Hear, hear !)

14TH SPEAKER, L. (an Irish Member).

Sir, it strikes me as being something extraordinary that no one up to this time has demanded the admission of ladies to these benches as a *right !* (Hear, hear ! Oh, oh !) Now, that is what it really is ; and I defy you to show me a law of this realm that distinctly, and in set terms, forbids the ladies sitting here ! (Hear, hear ! Bravo !) I grant you it has never been done : but everything has a beginning—except the Prime Minister's arguments, which have neither body, head, nor tail—and the sooner ladies demand that right the sooner they are likely to get it. (Hear, hear !)

I speak for liberty. Never mind if it will do the men harm. Never mind if it seems to lower men as it raises women. Right is right, and to bar the way to right is itself wrong ! Women demand the *right*, and it lies in the hollow of no man's hand to deal them out *wrong* instead. Right is right, I say, and must prevail ! (Cheers.) Therefore, let us give way. (Hear, hear ! No, no !) Let us welcome the sweet creatures within these walls, even though they become our masters. (Cheers and No, no !) Remember there are women as well as men to legislate for, and who shall dare to say that in that work women shall not participate ? (Bravo !)

I shall oppose the motion of the Prime Minister entirely, and give my warmest support to the ladies—more power to them ! (Hear, hear ! Cheers ! Several rise to speak—one is named.)

15TH SPEAKER, R. (a Scotch Member).

Mr. Speaker, I am afraid that the zeal of the opposite party has something to do with the anticipated votes of the ladies. (Hear, hear ! No, no !) Women are terribly conservative, and that is the only thing I have to say against them. (Laughter !)

I, myself, would readily admit them, but for the consideration that it would be very distressing to my feelings to hear Mrs. Robinson, for example, *Conservative Member* for *West* Marylebone, declare from the *opposite* benches, that Mr. Robinson, her husband, *Radical Member* for *East* Marylebone, and sitting on *these* benches, was bringing the country to ruin by his blundering and plundering policy. (Laughter !)

And it would be equally distressing to my tender feelings to hear Mr. Robinson, *Radical Member* for *East* Marylebone, sitting on this side, say to Mrs. Robinson, his wife, *Conservative Member* for *West* Marylebone, and sitting over *there*, that if she did not wake her musty, fusty, frowsy, drowsy party up a bit the whole country would go to the dogs ! (Loud laughter !)

There is one thing, however, I am sure the ladies would do, and that is, they would help me fight the perfect army of brewers who manage to get into Parliament. (Hear, hear ! and laughter.) I verily believe they make the fellows who vote for them tipsy, and then drag them to the poll. (Hear, hear !)

Seeing, therefore, that there are *pros* as well as *contras*, and hoping that one with more *suaviter in modo* than I claim to possess will find a way out of the difficulty, without ruffling the feathers or the tempers of the ladies, I shall keep an open mind on the subject till I am convinced which way to vote. (Hear, hear ! on both sides—Divide ! Divide !—bell.)

16TH SPEAKER, L.

Sir, my lords and gentlemen, before we proceed to a division, I shall endeavour to pour oil on the troubled waters of this stormy debate, by doing all in my power to produce such a calm as will enable us to vote without anger, and without excitement. (Hear, hear !)

There is much, no doubt, to be said on both sides. On the one hand, it has been proved, beyond the shadow of a doubt, that woman is physically weaker than man ; but whether she is altogether too weak to perform the duties of a Member of Parliament is another question. (Hear, hear ! on right.) For myself, I think she is not. (Hear, hear ! Yes, yes ! No, no ! Divide !—bell.)

My point is proved by the fact that ladies already sit on School Boards, Vestry Boards, and other councils, and there undertake work which a few years ago would have been considered too arduous for them to perform. (Hear, hear ! on Right.)

And, again, it is quite possible, nay, even probable, that the highest form of intellect is seldom, if ever, found amongst women ! (Hear, hear ! on Left.) But, then, we don't want the House of Commons packed with geniuses ! (Hear hear, on Right.) So long as the *best* intellects among women are as good as the *average* intellects among men, we can surely find room for a few of the former here. (Hear, hear ! and No, no !) Let no one forget our Newnham girls and our Girton girls ! (Hear, hear !) Many of them have far superior intellects than have been possessed by many of the masculine boobies who have graced, or disgraced, these benches. (Cheers on both sides.) I feel sure I have said enough to secure for the ladies the doubtful vote upon the other side. ('Certainly,' from 15th Speaker.)

In that case, the victory is already ours ! (Hear, hear ! on Right.) But the conquering can always afford to be generous, so I will try to build a golden bridge for the Government to retreat by. (Oh, oh ! and Hear, hear !)

They say it is not *desirable* to have Lady Members of Parliament, (Hear, hear ! on Right.) We say, it is *desirable*, but, for the present, not *practicable !* (Hear, hear ! on Left.) If, therefore, the mover and seconder, with the consent of you, sir, will put the words 'until they get there' at the end of their proposition, both sides will be satisfied, and we shall be able to present to the country to-morrow morning, through the medium of the press, a unanimous decision. (Loud cheers on both sides.)

MR. SPEAKER.

The rider proposed is quite in order, if the right hon. gentleman concerned agree to it.

1ST SPEAKER (after the usual consultation).

We quite agree, and are deeply indebted to our friends the Opposition for the kind suggestion. (Hear, hear ! on Right. Cheers on Left.)

MR. SPEAKER.

Then I will put it to the vote. It is proposed and seconded 'That in the opinion of this House it is not desirable to have "Lady Members" in Parliament *until they get there !*' All who agree, cry 'Aye !' (All cry 'Aye !') On the contrary, 'No !' (Silence.) Carried without a dissentient. (Loud cheers.)

Curtain.

NEW COMPOSITION STORIES.—STANDARD V. AND 1st YEAR P.T.'s.

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434.

THE LADY AND THE BEGGAR.—A lady was some time ago followed by a beggar, who very importunately asked her for alms. She refused him, when he quitted her with a profound sigh, saying: 'The alms I asked would have prevented me from executing my present resolution.' The lady was alarmed lest the man should make some rash attempt on his life. She called him back, and gave him a shilling, and asked him what he meant. 'Madam,' said the fellow, laying hold of the money, 'I have been begging all day in vain, and but for this shilling I should have been obliged to work.'

435.

AT THE RISK OF HIS LIFE.—Not long ago a fire broke out in a gun manufactory. A vast crowd assembled, and all the efforts of the police were powerless to keep the people back. Presently a man was heard from the excited throng, offering to go in for the powder, with a view to reaching it before the fire, and thus preventing dreadful loss of life and property. The man leaped through a window on to his knees, and groped to the spot where he had been directed. Seizing a huge copper box, that weighed 75 pounds, he flung it out of the window. The air was now stifling, but he repeated his task, and saved the second box. He then sprang out of the window. Fifteen minutes afterwards the whole building was in a blaze, but the powder was safe under water.

436.

A KNOWING HORSE.—There is a very fine horse in the possession of some eminent brewers, which is so tractable that he is left sometimes to walk about the yard, and return to the stable, according to his fancy. In the yard there are also a few pigs of a peculiar breed, which are fed on grains of corn, and to these pigs the horse has evidently a great objection, which is illustrated by the following fact:—There is a deep trough in the yard, holding water for the horses, to which this horse goes along with his mouth full of corn, which he saves from his supply. When he reaches the trough, he lets the corn fall near it on the ground, and when the young swine approach to eat it (for the old ones keep aloof), he suddenly seizes one of them by the tail, pops him into the trough, and then capers about the yard seemingly delighted with the frolic. The noise of the pig soon brings the men, who know from experience what is the matter, to his assistance, while the horse indulges in all sorts of antics, and then returns quietly to the stable.

437.

DOCTORING THE WRONG LEG.—A country lad in the north of Scotland got his leg hurt at one of the local factories. His mother, who had great faith in a neighbouring bone-setter, wanted the lad to go to him. Accompanied by his anxious parent, he was, after a rather painful journey, taken to the town where the surgeon resided. The leg was duly examined, and it was found necessary to haul it very severely in order 'to get the bone in.' The lad screamed loudly while this was going on; but eventually the bone was 'got in,' and he was told to go home, and in a few days he would be all right and fit for his work. 'Didn't the doctor do the thing well?' said the joyous mother. 'Yes, he did, mother,' answered the lad; 'but I wasn't such a donkey as to give him the bad leg!'

438.

BREAKING IT GENTLY.—A dreadful accident had happened, and a man was killed. A party of friends conveying him home in a cart sent one of their number on to prepare his wife, Mrs. Brown, and break the sad news to her as gently as possible. The man went on very slowly, his heart failing him, until the cart drew very near the house. Then, going up to the door, he knocked loudly. 'Does the widow Brown live here?' the man asked. '*I* live here,' replied the woman who opened the door, 'but I'm *Mrs.* Brown, not *widow* Brown.' 'Oh! ain't you, though,' answered the man; 'just you wait till you see what's in that cart.'

439.

TOO MUCH FOR THE ECHO.—Some years ago a remarkably fine echo was discovered on a gentleman's estate. He was proud of it, of course, and excited considerable envy by its exhibition. He declared himself ready to unfold his secret, and an afternoon was appointed for his friends to come and listen to the marvellous discovery. 'Hallo!' cried he, when they reached the spot. 'Hallo!' came back from the hillside. 'How are you?' yelled one of the company, and the echo answered in a suspiciously different key, 'How are you?' All went well until just before retiring, when one of the company, putting his hands to his mouth, cried out: 'Will you have some whisky?' This was too much for the echo. Judge of the surprise of the party when the answer came back, in clear tones: 'Thank you, sir; I will, if ye please.'

440.

DEAR PROVISIONS.—In the month of January 1871, when all kinds of food were at famine prices in Paris, a lady went into a shop and asked the price of the only Dutch cheese remaining in stock. 'It is eighty francs, Madame,' replied the shopkeeper. 'Eighty francs!' cried the lady; 'why the cheese has been eaten by rats, as you see, and I really believe there is one in the middle of it now.' 'Ah!' exclaimed the shopkeeper, 'then that will make a difference in the price, of course. If there is a rat inside the cheese, Madame, I must charge you one hundred francs for it.'

441.

MIGHT HAVE BEEN WORSE OFF.—Some people make themselves more miserable when in trouble by thinking how much worse off they are than others. An old sexton, who lived in a small village in Lancashire, although very ill and poor, on the other hand, was always ready to show that, however bad he was, it might be worse. Among other ailments this old man suffered from a very severe cough. One day the minister, while out for a walk, came across the old sexton leaning over the churchyard wall, and coughing violently. Coming up to him, the minister remarked, 'That's a nasty cough you have, John!' 'Yes, sir, that it is,' answered John; but, he added, nodding his head in the direction of the churchyard, 'there's many and many a poor soul over there would be glad of it.'

442.

A CLEVER DOG.—One summer afternoon a group of children were playing at the end of a pier, when one of the party made a backward step off from the pier into the water. None of his companions could save him, and their cries brought no one from the shore. Just as he was sinking for the third time a Newfoundland dog rushed down the pier into the water and pulled him out. The children who stayed behind took the dog to a confectioner's on the shore and fed him with a great variety of cakes and sweets. The next afternoon, the same group of children were playing at the same place, when the hero of the day before came trotting down to them with the most friendly wags and nods. There being no occasion this time for supplying him with delicacies, the children only stroked and patted him. The dog, however, had not come out of pure sociability; a child in the water and cakes and candy were what he wanted, so, watching his opportunity, he crept up behind the child who was standing nearest to the edge of the pier, gave a sudden push, which sent him into the water, then sprang in after him, and gravely brought him to the shore, looking up for the cakes.

443.

SEATS AT THE TABLE.—A short time ago, a train stopped at a small village. On the guard crying out: 'Fifteen minutes for dinner,' the passengers, of whom there happened to be a large number, rushed into the dining apartment, and took their seats at the table, one of them depositing his carpet bag on the chair next to him. At the usual time the landlord, passing around to make his collection, called upon the aforesaid passenger for his payment for dinner. 'How much?' asked the passenger. 'Eighty cents,' replied the landlord. 'Eighty cents for a dinner? Why that is extortionate.' 'No, sir, it is not extortionate. Ain't that your carpet bag?' 'Yes, sir, that's my carpet bag.' 'Well, that carpet bag occupies a seat, and, of course, I must charge for it.' 'Oh! is that the case? Well here are your eighty cents.' Turning to the carpet bag, the passenger remarked: 'Well, Mr. Carpet Bag, as you have not had much to eat, suppose we take something,' at the same time opening its mouth, and putting in half a ham, a roast chicken, and a plate of biscuits, amid the laughter of the other passengers.

444.

A SYMPATHETIC MULE.—One of a team of mules, during a violent fit of kicking, accidently broke his mate's shoulder-blade. The injured animal had to be killed next day. The survivor was grief-stricken, and would not be comforted. He broke loose from

his fastenings and went off in search of his dead mate. Failing to find it, he made for a river, which was several miles distant, walked into the stream, then deliberately threw himself on his side and drowned himself.

445.

SMART CONJURING.—A corporal and two privates, having in their custody a deserter, were resting themselves at a country tavern not long ago. The deserter amused his guardians with several entertaining tricks, but, being encumbered with handcuffs, complained that he could not display his skill to advantage, and requested to have his hands at liberty whilst he exhibited a trick which he described. This being agreed to, he proceeded to tie the hands of the three soldiers together with a handkerchief, and he was to loose the four with one motion simultaneously. The magic knots were tied, but they all remained firm except the one which held the deserter. This came asunder with a touch, when he lifted up the sash, darted through the window and got away, leaving his keepers raging at each other.

446.

AN HONEST MESSAGE BOY.—An old woman, while walking, not long ago, through the streets, had the misfortune to lose upwards of £200, the savings of thirty years of industry and privation. As may be imagined her distress was great. She did nothing but bemoan her loss for hours, and next day she was still much depressed. In the midst of her grief a knock came to the street door, which, on being opened, disclosed a bright-eyed boy who held something in his right hand. This was the lost money, which he had found in the street the night before. He had heard the report of her loss, and had brought the treasure to her as soon as he had ascertained where she lived. The poor woman threw her arms around his neck, and sobbed, 'God bless you, my boy!' She gave him £10 as a reward for his honesty. The lad was a message boy, fifteen years old.

447.

PREPARING FOR A RAINY DAY.—There lived in a country village a farm labourer, who was in the habit of attending the annual fair, staying two or three days, spending his money and indulging rather freely in liquor. When he returned, his master gave him a severe lecture on the folly of spending his money so foolishly, and concluded by telling him to *prepare for a rainy day*. Imagine the farmer's surprise when he replied, 'I have, master. I have bought two umbrellas and a parasol.'

448.

PRINCESS EUGENIE'S DIAMONDS.—Princess Eugenie, sister to the King of Sweden, sold her diamonds to help to pay for the building of a hospital. After it was finished, she went to see the sick people; and one of them was so thankful for her kindness that he shed tears as she stood bedside his bed. The princess was startled into reflection, and exclaimed, 'Ah! now I see my diamonds again.'

449.

TYRANT AND DOCTOR.—One day a man, in an agony of pain, came to a celebrated doctor, and asked to have a tooth drawn. 'Man, you're not needing a tooth drawn,' said the doctor. 'Go home and put a poultice to it.' An argument ensued, during which the sufferer, driven to desperation, cried out: 'I don't suppose you *can* draw teeth!' At this the doctor seized his forceps and jumped over the counter. 'I'll draw every tooth in your head!' he shouted, and started in pursuit of his patient, who rushed out of the house vainly shrieking for aid. He was finally outrun by the doctor, who got him down on his back, and triumphantly took out two of his teeth on the spot.

NEW READING TESTS.—STANDARD III.

Suitable for 'Unseen Tests' in Dictation also.

309.—The warrior on the other side had come down to the edge of the stream to note the result of the meeting between man and beast. In this position he was so near the first red man, that, instead of signalling to each other, they indulged in conversation. The little girl, of course, understood not a word that passed between them.—(H.M.I.'s Test.)

310.—During their absence at school, she made them some delicious cakes, and packed the baskets for them, and had everything in readiness for their start. Not even the matches were forgotten, wonderful to relate; for whenever was there a picnic at which some small but most important article was not forgotten?—(H.M.I.'s Test.)

311.—After this the children were quite happy together, and Jane told her new cousin all about her friends, and especially about the timekeeper over the road, who looked after the omnibuses. 'There he is,' she said, as she looked out of the window, and pointed to a kind-faced old man, with grey hair and red cheeks. 'He is my greatest friend. I must introduce you to him to-morrow.'—(H.M.I.'s Test.)

312.—He and his uncle often heard of the services held in the dead of night by these people; heard too of beautiful deeds of bravery and mercy done by them. But all this affected them little beyond grieving their kind hearts that those who seemed so good should be treated so harshly.—(H.M.I.'s Test.)

313.—Within the next three minutes other sounds of the night drew her interest away from herself. A bird seemed to whistle several times across the river. She would have believed it was a bird, had not the Indian in front emitted exactly the same sounds; then she knew two red men were signalling to each other from opposite sides of the stream.—(H.M.I.'s Test.)

314.—That spring was one of the wettest ever known in the west of England. The farmers grumbled and shook their heads, and foretold a very bad harvest; and the labourers grumbled and shook *their* heads as they went through the deep sloppy mud in the pouring rain; and the people who lived along the river-bank shook *their* heads too, and looked very grave.—(H.M.I.'s Test.)

315.—They had as pretty and as comfortable a home as ever any cats could wish for, and plenty of good wholesome food. They were even allowed now and again to pay visits inside the house, to sit on the drawing-room hearth before the fire, or in the laps of their mistresses, who fondled them in the kindest manner possible, and yet they were not satisfied!—(H.M.I.'s Test.)

316.—The father smiled when he heard the story of their disappointment, and picking out one of the pebbles from their basket, he ground and polished it before their eyes. It was a lovely moss agate, and so with the others. Putting each to the wheel, the father brought some unexpected beauty to light, turning the disappointment of his little lads into gratification and astonishment.—(H.M.I.'s Test.)

317.—The wind began to blow steadily now, and the heat consequently became greater. The men hurried along the track—no longer after the natives; they were trying to get round the great fire, though, of course, ignorant to what extent it was spreading, and whether it was increasing in front, or at their right hand only.—(H.M.I.'s Test.)

318.—Now was the time for her to run about and speed to the blockhouse, for the way was open, and nothing was to be feared from the bad men who were in her path in the opposite direction. She looked behind her in the gloom, and stood for a moment hesitating whether to start or stay where she was. She pictured her parents lying awake in their bed, listening to the sound of her footsteps.—(H.M.I.'s Test.)

319.—No sooner had May closed her eyes than a very strange thing happened. She fancied she was looking into the paint-box, and that all the paints appeared to have faces, and were talking as fast as they could. At first May could not understand what they were saying, but after listening a little while she found they were having an argument as to which colour was the most beautiful.—(H.M.I.'s Test.)

320. Ever persevere, boys,
Though your task is hard;
Toil and happy cheer, boys,
Bring their own reward.
Never give it up, boys,
Always say you'll try,
Joy will fill your cup, boys,
Flowing by-and-by.

NEW DICTATION TESTS.—STANDARD IV.

Suitable for 'Unseen Tests' in Reading also.

No. 324.

WAVES are very deceptive. To look at them in a storm one would think the whole water travelled. The water stays in the same place, but the motion goes on. Sometimes in storms these waves are forty feet high, and travel fifty miles per hour—nearly twice as fast as the fleetest steamship. The base of a wave—the distance from valley to valley on either side at the bottom—is generally reckoned at being fifteen times the height, therefore an average wave, say one twenty-five feet high, has a base extending over 375 feet. The force of waves breaking on the shore is said to be seventeen tons to the square yard.

No. 325.

IN eastern countries storks are looked upon as sacred birds. And with good reason, for they render very useful service both as scavengers and as slayers of snakes, and other reptiles. In most of the towns a storks' hospital will be found. It consists of an enclosure, to which are sent all birds that have been injured. They are kept in this infirmary—which is generally supported by voluntary contributions—until they have regained health and strength. To kill a stork is regarded as an offence.

No. 326.

IN Holland it is customary, when there is infectious disease in a house, to notify the fact to intending visitors and the public generally, by tying a piece of white rag round the bell-handle. In many parts of the United States a red card with the word 'fever' upon it in the case of scarlet fever, and a yellow flag in the case of small-pox, are displayed; and this plan of warning people off infected premises has everything in its favour from the point of view of public health, although it must entail some inconveniences upon the inhabitants of the infected houses.

No. 327.

THE Hottentot sheep is of small size, with soft and short wool. Its peculiar characteristic is the enormous development of the tail, by the growth of a large mass of fat on each side of the lower part of this appendage. This is sometimes so great, that the tail alone has been known to weigh seventy pounds or more. It is esteemed a great delicacy for food, and to protect it from being injured by being dragged on the ground, the shepherd often places it upon a board or small truck with wheels, which is attached by a light string harness to the body of the animal.

No. 328.

BATS are not dependent upon their eyesight for a means of getting about in the dark. They are able to fly with great speed and accuracy, to avoid obstacles, and to enter small holes without making the least mistake. Experiments have shown that this singular power of direction is due to a remarkable development of the sense of touch, especially to be found in their great expanse of wing. Further, these animals possess large ears and curious nostrils, some of which are of the most extraordinary description.

No. 329.

IT is the custom in Madrid for friends and acquaintances to send presents of bonbons on birthdays, christening days, and festivals. A large silver tray is piled with sweets of various kinds, with a cake made of eggs in the centre. This is often surmounted with a silk flag or a pretty porcelain figure. Some lucky people receive as many as fifty of these trays on their birth and christening days.

No. 330.

DUCKS in China are kept on every farm, on the private roads, and on all the lakes, rivers, and small streams. There are many boats on each of which as many as two thousand are kept. Their eggs constitute one of the most important articles of food. They are hatched in establishments fitted up for the purpose. Some of them turn out as many as fifty thousand young ducks every year. Salted and smoked ducks are sold in all the towns, and many of them are exported to countries where Chinamen reside.

No. 331.

THE traveller landing in Holland during spring-time will see vast herds of fine cattle in every stretch of green meadows—and stretches of green meadow are everywhere in this flat and almost treeless country. Every shadeless field is defined by a deep stream of pure water, flowing between prim flowery banks, which serve, instead of fences, to keep the cattle within bounds.

No. 332.

THOUGH it is well known that dog-fishes are a terrible pest to all fishermen, owing to the havoc they make amongst eatable fish, few people realise how savage they are. In a certain bay in America a shoal of the species commonly called dog-fishes appeared in such numbers that the bay seemed alive with them. They drove before them other fishes, of which immense quantities were captured. The men took to fishing them for their livers. So ferocious were they, that they snapped at the oars, or any overhanging sails. When the net was hauled in, it was found that they sometimes had eaten each other. A man falling overboard amongst these monsters would stand but a very poor chance of his life.

No. 333.

THE crocodile devours all kinds of birds it can get but one, the zic-zac. It is said that when the crocodile comes on shore he opens his jaws, and this bird enters and swallows the leeches which are found about the animal's jaws and teeth, and which have collected there owing to the creature being for so long a time in the water. The relief afforded by having the leeches withdrawn induces the crocodile to tolerate the presence of the bird.

No. 334.

AFTER drinking tea for a century or two, we may still learn something from the Chinese in the matter. They make and drink their tea differently from us. We draw our tea and let it stand. In China they pour boiling water into a cup, and turn some tea into it, and when the leaves sink to the bottom, which happens in a few seconds, they pour the water off and drink it. The result of our way is that the tannin is squeezed out of the stewed tea-leaves, and we get a strong and bitter decoction, which helps to wreck our nerves instead of the gentle stimulant that the Chinese beverage amounts to.

No. 335.

IT may not be generally known that the wind now and then takes it into its head to make snowballs. Quite recently many square miles of country in the United States were covered with snowballs of all shapes and sizes, which the wind had rolled up in a single night. On the previous evening a light but damp snow fell on the frozen ground, and the wind began to set in motion small pellets of snow, and to roll them along till they became too large to be moved further.

No. 336.

IN the island of Reunion is a plant known as the wild orange, which produces a fruit, green at first, afterwards bluish, and verging into purple as it ripens. This has been tested, and found to make a beverage in every way equal to coffee, and at a much lower price. The product can be used alone, or mixed with pure coffee. It is announced that about twenty-four thousand acres of this plant are now being cultivated. It is most likely, however, that chicory, more than coffee, will suffer from its introduction.

No. 337.

THE interest on money is so high in Siam, that when a man once gets in debt, the most he can possibly hope for by the hardest kind of work is to pay the interest on what he owes. This, of course, has discouraged industry, and has encouraged the practice of allowing women to do most of the work. Man, being proud and ambitious, soon tires of industry indulged in for its own sake.

No. 338.

THE most curious in the way of Dutch business signs is probably that which intimates that the proprietor of an establishment has 'Fire and water for sale.' At first sight this might appear rather unintelligible to an Englishman; but on inquiry it will be discovered that many of the poorer inhabitants who cannot afford to keep a fire in the house going all day, are in the habit of purchasing red-hot turf to warm themselves when their day's work is over, or hot water to make tea and coffee for their evening meal.

No. 339.

THE telephone is now used by deep water divers. A receiver and transmitter combined is affixed to the inside of the helmet near the diver's ear. By a slight turn of his head he can speak into the telephone, and he can hear readily from it at all times. Its value in deep-sea work, for reporting progress or receiving instructions, is clear. Formerly the only communication was by a system of pulls at a cord.

No. 340.

CAMELS dislike individuals of their own species; they also dislike both men and women; and, being uncommonly suspicious by nature, they will shirk a forest as long as they can. They like best to be alone on a vast, unimpeded plain, where they are surrounded by those beauties of Nature which they most admire, and which can hide no foe. They have been well called 'ships of the desert,' because if they get within speaking distance of one another, the chances are they will collide.

No. 341.

THE Sandwich Islands is a country in which babies are taught to swim first. The mothers take their babies and lay them on the surface of the water, encouraging them to kick about as if lying on their mats on shore. The children take to the water like ducklings, and can swim long before they can walk; indeed, they are much fonder of swimming than of walking at all ages.

No. 342.

OH what a glory doth this world put on
For him who, with a fervent heart, goes forth
Under the bright and glorious sky, and looks
On duties well-performed, and days well spent!
For him the wind, ay, and the yellow leaves,
Shall have a voice, and give him eloquent teachings.
He shall so hear the solemn hymn, that Death
Has lifted up for all, that he shall go
To his long resting-place without a tear.

STANDARDS V.—VII., AND 1ST & 2ND YEAR P.T's.

Suitable for 'Unseen Tests' in Reading also.

No. 292.

THERE are no telegraph poles in China. Not because there are no telegraph lines, nor yet because there is not wood suitable for use as poles. Strangely enough, the reason is purely religious. The Chinese worship their dead fathers and grandfathers, and regard the resting-places of their remains as so sacred that they deem it a sacrilege to allow a shadow to be cast upon their graves. When the workmen of the first Chinese telegraph companies began operations, they were greatly embarrassed in their undertaking by crowds of inhabitants who followed them about, and with the most frightful blasphemies cut down the poles as fast as they were erected. For some time no explanation could be obtained, but at last the working parties discovered that in the more thickly settled districts of the Celestial Empire graves were everywhere to be found, and scarcely a pole could be erected anywhere but that at some time of the day it cast its shadow on a grave.

No. 293.

CAMPHOR is made in Japan in this way: After a tree is felled to the earth it is cut into chips, which are laid in a tub or a large iron pot partly filled with water and placed over a slow fire. Through holes in the bottom of the tub steam slowly rises, and heating the chips generates oil and camphor. Of course the tub with the chips has a closely-fitting cover. From this cover a bamboo pipe leads to a succession of other tubs with the bamboo connections, and the last of these tubs is divided into two compartments, one above the other, the dividing floor being perforated with small holes to allow the water and oil to pass to the lower compartment. The upper compartment is supplied with a straw layer, which catches and holds the camphor in crystal in deposit as it passes to the cooling process. The camphor is then separated from the straw, packed in wooden tubs, and is ready for market.

No. 294.

'THERE is no power of love so hard to get and keep as a kind voice. A kind hand is deaf and dumb. It may be rough in flesh and blood, yet do the work of a soft touch. But there is no one thing that love so much needs as a sweet voice to tell what it means and feels; and it is hard to get and keep it in the right tone. One must start in youth and be on the watch night and day, at work and play, to get and keep a voice that shall speak at all times the thoughts of a kind heart. It is often in youth that one gets a voice or a tone that is sharp, and it sticks to him through life, and stirs up ill will and grief, and falls like a drop of gall on the sweet joys of home. Watch it day by day as a pearl of great price, for it will be worth more to you in days to come than the best pearl hid in the sea. A kind voice is to the heart what light is to the eye. It is a light that sings as well as shines.'

No. 295.

THE current and popular belief that a drowning person necessarily rises and sinks three times before life becomes extinct is quite groundless. The specific gravity of the human body is so near that of water, that a comparatively slight effort will suffice to bring a sinking person to the surface again. In a case of drowning, the individual first sinks to a certain depth, and then ascends to the surface of the water, where, if not a good swimmer, he struggles to clear his lungs and mouth and obtain fresh air. As water is generally taken in with the inspired air, he sinks for a short distance, and then by his exertions again succeeds in reaching the surface. These struggles are repeated until the lungs and stomach are filled with water, when the body sinks to the bottom.

No. 296.

THERE is no prettier hour of the day in a hop-garden than that in which the men, women, and children, by common consent, strike work. They have no thought of throwing themselves into picturesque attitudes; but they do so, nevertheless, and quite unconsciously; and the loiterer with a taste for the beautiful can do no better than lean over a gate and gaze unobserved at the honest, healthy toilers munching their simple meal or reclining among the pulled-down poles and piled-up bine, till the ending of the restful hour sets them on their feet again, and sends them once more to their steady, but scarcely arduous toil. (H.M.I.'s Test.)

No. 297.

A CAMEL is one of those aggravating animals which will drive a hot-tempered man to distraction. Nothing will persuade him to listen to reason. He will oppose your will with a passive resistance that is absolutely unconquerable. The only way to treat a camel is to humour him. They will often lie down, if you load them with the proverbial last straw, and you might beat them to death or offer them all the pleasures of Paradise before they would get up. Sometimes when they have quite a light load they throw themselves to the ground. But although they are obstinate they are not particularly cute, and an Arab, by pretending to submit, can generally get the better of the stubborn beasts.

No. 298.

IN these days of rapid advancement and almost phenomenal progress of thought, there is a tendency among the younger members of society to lose sight of the proper respect due to those older than themselves. Reprehensible as this conduct is to strangers or mere acquaintances, it is far more so when children neglect their filial duty and forget the respect and obedience due to their parents. Nothing so tells against a young man or woman as the evident feeling of shame they manifest because of an old-fashioned or illiterate father or mother. It should be constantly borne in mind that the superior advantages enjoyed by the younger generation have been obtained through the sacrifice and hard work of the self-same old people.

No. 299.

IT is possible that the saline elements of sea-water may be in part derived from geological formations which consisted largely of these elements, but it is generally considered that the saltness of the ocean is sufficiently accounted for by the deposition of soluble salts from the rivers. Salts of various kinds form part of the constituent ingredients of the earth's soil everywhere; they are washed out by

springs and rivulets, and carried to the sea by large streams, and as the evaporation which feeds the streams carries none of the dissolved matters back again, the tendency is for the salts to accumulate in the sea.

No. 300.

THE sitting-room in which the Queen works during her residence in Scotland is very large, and a prominent object on an easel near the writing-table is an admirable portrait of Prince Albert. The huge writing-table is usually covered with papers and letters and telegrams, and there are several family photographs on it. The Queen has a table at her right hand which bears numerous dispatch-boxes, and on another table is a silver tray on which her Majesty deposits documents which she has dealt with, and when the tray is full it is carried off to her private secretary, who arranges and packs the contents. Another table is covered with books, and close to it is the Queen's favourite easy-chair.

No. 301.

EVERY man hath received some gift; no man all gifts; and this, rightly considered, would keep all in more even temper; as in Nature nothing is altogether useless, so nothing is self-sufficient. This, duly considered, would keep the lowest from repining and discontent; he hath received something that is not only good to himself, but, rightly improved, may be so to others. And this thought will curb the loftiness of the most advanced, and teach them not only to see some deficiencies in themselves, but some gifts in the meaner persons which they want.

No. 302.

IT is said of a great poet that a stranger having on one occasion asked to see his study, the maid said, 'This is master's room, but he studies in the fields.' The agricultural labourer learns a great deal in the fields. He knows much more than we give him credit for, only it is field learning, not book learning—and none the worse for that. But the man who works in a shop or manufactory has a much more monotonous existence. He is confined, perhaps, to one process, or even one part of a process, from year's end to year's end. He acquires, no doubt, a skill little short of the miraculous, but, on the other hand, very narrow. If he is not himself to become a mere animated machine he must generally obtain, and in some cases he can only obtain, the necessary variety and interest from the use of books.

No. 303.

AUSTRALIA is a country in which Nature has established conditions unknown elsewhere, and where civilization must adapt itself to surroundings which it finds novel and strange. It is a country full of absurdities in animal, vegetable, and human life. Its native race, in point of intelligence and development of resources, is far below even the cave-dwellers and the people of the stone age of Europe. Its animals perpetuate types which disappeared from every other part of the globe some millions of years ago. Its trees and plants are representative of species found elsewhere only in chalk and coal measures. Hardly anything here has the character and quality of its relations in other lands. Although the trees and flowers are chiefly those of the temperate zone, the birds are, for the most part, of the tropics.

No. 304.

A CURIOUS instance of what might be called a device of Nature to secure the continued existence of certain forms of life under disadvantageous circumstances has recently attracted attention in discussion of the brilliancy of the colours of Alpine flowers. It is known that insects are most important agents in the fertilisation of flowers, and this is true of the flowers that bloom among the snows of the Alps, as well as those that cover the meadows far below. But it has been observed, at the same time, that the bees and butterflies which ascend the mountains in order to visit the brightly-coloured flowers growing there perish by the thousand in the sudden cold that envelops the peaks and glaciers at nightfall.

No. 305.

THE great secret of reading is to obtain intellectual pleasure and profit, and broader views concerning everyday life and actions. The man who devotes himself exclusively to any one branch of science or literature is not at all likely to be a desirable or even agreeable companion. There are exceptions, of course, but these only go to prove the rule. The instances are innumerable in which the pure and simple specialist has exhibited the most profound ignorance on matters which a school-boy would be severely punished if he were to blunder in such a fashion. There should, perhaps, be a certain method in desultory reading, but taking our example from the bee, which goes from flower to flower, and gathers honey from each, the practice is one to which only a few narrow-minded specialists can object.

No. 306.

I THINK it is not national prejudice which makes us believe that a high-bred English lady is the most complete of all Heaven's subjects in this world. In whom else do you see so much grace and so much virtue, so much faith and so much tenderness, with such a perfect refinement and chastity? Almost every man who lives in the world has the happiness, let us hope, of counting a few such persons amongst his circle of acquaintance—women in whose angelical natures there is something beautiful to contemplate; at whose feet the wildest and fiercest of us must fall down and humble ourselves in admiration of that adorable purity which never seems to do or to think wrong.

No. 307.

Hail, Sabbath! thee I hail the poor man's day,
The pale mechanic now has leave to breathe
The morning air pure from the city's smoke;
While wandering slowly up the river side,
He meditates on Him whose power he marks
In each green tree that proudly spreads the bough,
As in the tiny dew-bent flowers that bloom
Around the roots; and while he thus surveys
With elevated joy each rural charm,
He hopes (yet feels presumption in the hope)
To reach those realms where Sabbath never ends.

COMPOSITION TESTS.—STANDARDS VI. & VII., AND 1ST & 2ND P.T.'S.

Write at least 20 lines on ONE of the following:—

125. A hard winter, its causes and results.
126. The beauties of Nature.
127. The pleasures and hardships of life in a new Colony.
128. The study of Natural History.
129. The importance of accuracy in little things.
130. The value of open spaces and public parks to a crowded city.
131. The chief inventions of the present century.
132. The changes in modern life caused by railways and telegraphs.
133. To rise early, to live soberly, and to be diligent are the sure means to success. Prove this.
134. The pleasures and uses of a garden.
135. Lifeboats and their services.
136. The evils of procrastination.
137. Use and abuse of riches.
138. The value of the study of History and Geography.
139. Every cloud has a silver lining.
140. Your favourite flowers, and the way to cultivate them.

LEGAL AND CODE QUERIES COLUMN.

RULES.

1. All communications must be addressed 'Legal Editor, PRACTICAL TEACHER, Froebel House, St. Andrew's Hill, Doctors' Commons', E.C.,' and must be accompanied by our 'coupon,' duly filled up.
2. Replies will be given *only* in this column, except under the conditions named in Rule 3.
3. If any reader desires a reply by post, such can be forwarded by enclosing, in addition to the coupon, a stamped addressed envelope and either stamps or a Postal Order to the value of one shilling.
4. No original documents should be forwarded, but copies only. We cannot hold ourselves responsible for any losses which occur through non-observance of this rule.

SUMMER JOYS ARE O'ER.

Andantino mf.
1st T. & Alto or 2nd T.
Bass
Sum-mer joys are o'er, Flow'rets bloom no more;
Key A. Andantino mf.
Win-try winds are sweep - ing, Through the snow-drift peep - ing
Key E t.
Cheer-ful boughs of green Rare - ly now are seen.
Key A f. f. p.

2. Now no plumèd throng
Charms the woods with song.
Ice-bound streams are glitt'ring,
Merry snow-birds twitt'ring
Fondly strive to cheer
Scenes so chill and drear.

3. Winter, still I see
Many charms in thee;
Love thy chilly greeting,
Snow-storm fiercely beating,
And the dear delights
Of the long, long nights.

OUR 1896 CERTIFICATE CLASS.

BY J. C. HOROBIN, M.A.,
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FIRST YEAR—MEN.

Reading, etc.

See November number.

Penmanship.

Write in text hand and small hand :—

Reciprocity.
The ripest fruit first falls.

Spelling.

Write from dictation :—

In England the School of Evolution | originating in the School of Utilitarians | finding | besides | in the nation itself | traditions of Utilitarianism | has allowed itself to be led astray by the mirage of the Natural Sciences | and has aimed at making those sciences the basis of instruction. In the Science of Education | therefore | this School has upheld 'natural' studies in opposition to those which may be called 'human.' Spencer begins his book on Education by declaring that in all things the end to be attained is knowledge | a principle the falsity of which we have seen. Thus | through the whole of his treatise | Spencer is wavering between the ideal of primary and that of higher education | without even a suspicion of what secondary education is. This idolizing of the natural sciences is all the more surprising | inasmuch as Spencer | in his Sociology | insists on the powerlessness of instruction to modify individuals and peoples | on the inefficacy of primary knowledge | on the all-powerful influence of heridity | on the prevalence of sentiments over abstract ideas. Spencer's pædagogy is thus at variance with his own views | and is eagerly pursuing an end the insufficiency of which it has shown.

Further | he confuses the inward evolution of man with the outward objects | a knowledge of which may modify | but could not cause it | man is absorbed in nature | truly the humanities exist no longer.

School Management.

1. If your advice were asked by managers as to the fitting and furnishing of an Infant School, or class room for younger children, what suggestions would you make about the fixtures, decoration, books, and apparatus which such a room should contain?

2. How far is it possible for a teacher to exercise influence over the conduct of children out of school, and by what means can such influence be best exerted?

3. Write notes of a lesson on these subjects, and say for what class of children your lesson will be adapted :—Emigration. A passive verb.

4. The Code prescribes that some of the exercises in mental arithmetic should be preparatory to the work of the next higher standard. Frame twelve suitable oral exercises for scholars in the Fourth Standard, calculated especially to facilitate the study of fractions in the Fifth.

5. Give such explanations as would be needed in a class to make the following lines interesting and entirely intelligible to a class of children :—

Thy wish was father, Harry, to that thought ;
I stay too long by thee, I weary thee.
Dost thou so hunger for my empty chair
That thou wilt needs invest thee with my honours,
Before thy hour be ripe? O foolish youth!
Thou seek'st the greatness that will overwhelm thee.

6. Sketch a course of lessons on the 'Phenomena of Nature and of Common Life' suited to the highest class of an Infant School, or to children in the First Standard.

Composition.

Write a short essay on :—

(*a*) Travelling and its uses.
(*b*) Virtue is its own reward.
(*c*) Milton as a scholar, schoolmaster, controversialist.

Music.

1. What other four contiguous tones of the scale are separated by the same steps or intervals as (1) *s l t d'* and (2) l_1 t_1 *d r'*?

2. Describe the mental effects of the following notes :—
(1) *me.* (2) *fah.* (3) *te.* (4) *lah.* (5) *doh.*

3. Name (as major sixth, etc.) the following intervals :—
(1) m—d' (2) r—s (3) t_1—l (4) f—t
(5) l_1—s (6) m—t (7) ta—r' (8) m—fe

4. Re-arrange the following notes in order of pitch, placing the highest note first in each case :—
(*a*) s d fe l t_1 d' m ta r' f r m'
(*b*) d s_1 r f_1 fe t_1 ta m l_1 s d'

5. State the meaning of :—Molto, sempre, sostenuto, tempo primo, con moto, con brio.

Geography.

1. Whence do we obtain our chief supplies of corn, dried fruit, raw cotton, silk, timber?

2. Draw an outline map of Australia, showing the boundaries of the different colonies and the chief towns.

3. What do you know of the Fens, Downs, Black Country, Cleveland, Cottonopolis, the Broads?

4. Give some examples of English places which indicate a Roman, a British, or a Danish origin.

5. What are the chief natural productions of Canada?

6. Give a short account of the first settlement in India, and the successive additions to our possessions there.

History.

1. What do you know of the Statute of Labourers, Petition of Right, Act of Union (Ireland)?

2. Under what circumstances did the following places come into English hands :—Calais, Dunkirk, Jamaica, Gibraltar, Minorca?

3. What do you know of Warwick the King Maker, the Young Pretender, Nelson?

4. Explain the grounds on which the following persons were put to death :—Sir Thomas More, Lady Jane Grey, Somerset, Mary Queen of Scots.

5. State all you know of the Dissolution of Monasteries, Six Acts, Pilgrimage of Grace, Acts of Supremacy and Uniformity.

6. Name two great navigators, two great writers, two statesmen, of Elizabeth's reign, and for what they are famous.

Arithmetic.

1. Simplify

$$1\tfrac{1}{2} \times 12\tfrac{1}{2} \text{ of } \tfrac{2}{3} - \frac{6\frac{1}{2} + 7\frac{1}{2}\frac{5}{6}}{12 - 6\frac{2}{3}} - \frac{4 + \cfrac{1}{4 + \cfrac{1}{4 - \frac{1}{4}}}}{4}$$

2. Find the value of $\dfrac{(\frac{1}{2})^4 + (\frac{1}{3})^4 + (\frac{1}{6})^2}{(\frac{1}{2})^2 + (\frac{1}{3})^2 + \frac{1}{6}}$.

3. Find the value of $\dfrac{4}{\sqrt{17} - 3}$ correct to four places of decimals.

4. Divide £11 4s. between 3 men, 4 women, 5 boys, and 6 girls, in such wise that each woman has one-fourth less than a man ; each boy two-sevenths as much as a man and woman together, and each girl one-fifth as much as a man, woman, and boy together.

5. By the last census (1841) the population of Great Britain was found to be about 18,844,000. The parts employed in agriculture, and trade and manufacture were respectively 1,499,000 and 3,110,000. How much per cent. of the whole population was each of these classes?

6. A milk dealer buys pure milk at 11½d. per gallon ; how much water must he add that he may sell at 5d. a quart, and obtain a gross profit of 100 per cent.?

Algebra.

1. Many pupil teachers when asked to prove a formula simply give a numerical illustration. *Explain* why this is worthless.
Prove that $ab = ba$, where a and b are any positive integers.

2. Write down the second and third terms in the complete product of $(x + 1)(x + 2)(x + 3)(x + 4)(x + 5)(x + 6)$.

3. If $A = pB + C$; $B = qC + D$; $C = rD$, show that D is a common measure of A and B. Find the G.C.M. of $34(3x^3 - 8x^2y + 5xy^2 - 2y^3)$ and $51(x^3 - 4x^2y + 7xy^2 - 6y^3)$.

4. (*a*) Simplify $\dfrac{a}{b} - \dfrac{a^2 - b^2}{b^2}x + \dfrac{a(a^2 - b^2)x^2}{b^2(b + ax)}$.

(*b*) And find value of

$$\left(\frac{x}{x-1}\right)^2 + \left(\frac{x}{x+1}\right)^2 \text{ when } x = \sqrt{\frac{a-b}{a+b}}.$$

5. (*a*) The square root of a rational quantity cannot be partly rational and partly a quadratic surd.

(*b*) Find the square root of $32 - 10\sqrt{7}$.

6. Solve the equations :—

(*a*) $\frac{3x-25}{7} - \frac{33-x}{10} + \frac{8x-41}{21} = \frac{8x+1}{35}$

(*b*) $\frac{2x}{x-4} + \frac{2x-5}{x-3} = 8\frac{1}{3}$.

(*c*) $(x+1)(y+1) = 60$; $xy = 45$.

7. Prove that the square of the sum of any two numbers + the square of their difference = twice the sum of the square of the numbers.

Also that the sum of the cubes of three even numbers in A.P. is divisible by 24.

8. A boy has three hours at his disposal. How far may he travel in a coach at the rate of nine miles an hour, so as to return home in time, walking back at the rate of three miles an hour?

Euclid.

1. Prove I. 14. If two of the opposite sides of a quadrilateral be respectively the greatest and least, the angles adjacent to the least are greater than their opposite angles.

2. Prove I. 16. The perpendicular is the least line which can be drawn from a given point to a given line ; and of all others, that which is nearest to the perpendicular is less than any one more remote.

3. Prove I. 18. If ABC be a triangle having AB not greater than AC, a line AG, drawn from A to any point G in BC, is less than AC.

4. Prove II. 6. Show that this proposition reduces to the fifth by a proper construction.

5. Prove III. 14. If a chord of a given length slide round a fixed circle, the locus of its middle point is a circle ; the locus of any point fixed in the chord is a circle.

6. Prove III. 15. Through a given point, within or without a given circle, draw a chord of length equal to that of a given chord.

English.

1. Write a short criticism of Milton's prose style.

2. Comment on :—Lexicon, idle vacancies, themes, Anglicism, digested, praxis, arts, metaphysics.

3. Write a summary of Milton's ideas of the use, and proper method of acquiring, a knowledge of the ancient classics.

4. Comment upon the following words from 'The Bard' :—Helm nor hauberk, trance, haggard, Noel, Arvon, she-wolf, accursed loom, symphonious, buskened.

5. Analyse lines 49–62. ('The Bard.')

6. Parse : (1) ruin, King, (17) Robed, (30) That, (36) pale, (56) Shrieks, (60) What Terrors, (101) forlorn, (122) soul, (144) Deep.

SECOND YEAR—MEN.

Reading.
Penmanship.
Composition.
Geography.
History.
} As First Year.

Teaching.

See November number.

School Management.

1. What entries and cancellings are required in the daily registers? What modes of marking are forbidden?
What exceptions to cancelling are permitted?
How often are registers to be tested, and by whom?

2. Name the different purposes which should be kept in view in the teaching of Geography ; and say by what means they can be best attained.

3. Give some reasons for including physical exercises in the course of school discipline, and describe the best system of drill with which you are acquainted.

4. Describe the most effective ways you know of warming a school. Say what should be the ordinary temperature of a school-room, and what evils arise from permitting that temperature to become too high or too low.

5. Enumerate the practical counsels given by Locke in regard to the teaching of Writing ; and say by what plans, and by means of what sort of copy-books, you can best give effect to these counsels.

6. It is said that some school exercises and habits affect the eye-sight of children injuriously. Name some of these, and say by what tokens you would discover that a pupil's sight was defective, and needed the parent's attention.

7. Write out notes of a lesson on the following subjects :—
(*a*) Birds of passage.
(*b*) A carpenter's shop.
(*c*) Glaciers.

Music.

1. What are the three chief chords of the major scale? Write them in the order they are taught on the Tonic Sol-fa method.

2. Briefly describe the mental effects of the tones of the scale :—
te lah soh fah me rah doh.

3. Name (as major third, etc.) the following intervals :—
ns ft fn' sl nd'

4. Write the following passage an octave lower :—
d' t n' r' s d' r' f' n' s l t r' d'

5. The following passage is given in five keys. Which will sound highest, and which lowest?
Key E. **d t, r n d** Key B. **d t, r n d** Key C. **d t, r n d**
Key G. **t, r n d** Key A. **d t, r n d**

6. State against each of the following tones of the major scale its relation as noted by the terms dominant, tonic, etc. :—
(1) *doh* (2) *fah* (3) *soh* (4) *me* (5) *lah.*

English.

Gray.—As First Year.

Richard II.

1. Quote the lines beginning, 'This precious stone set in the silver sea.'

2. By whom, and under what circumstances, occur the words :—
'Things sweet to taste prove in digestion sour.'

3. Describe the character of John of Gaunt as depicted by Shakespeare.

4. Explain the allusions in :—
'Wanting the manage of unruly jades.'
'That young Mars of men.'
'Sweet peace conduct his sweet soul to the bosom of good old Abraham.'

Tempest.

1. Give an account of the history of Prospero as pourtrayed in his speech to Miranda.

2. Scan the lines :—
'The cloud capped towers, the gorgeous palaces.'
'Be not disturbed with my infirmity.'
'Then all a fire with me, the King's son Ferdinand.'

Macbeth.

1. Complete the quotation, and state under what circumstances it was said :—'Present fears——'

2. Define a tragedy, a historical play, and contrast them?

3. Give instances of disputed passages in the play. Discuss the Porter's speech.

Geometry.

1–6. As First Year.

7. Prove IV. 4. With the usual letters prove DA bisects the angle A.

8. Prove VI. 3. If AD, the external bisector of the angle BAC of a triangle, cut the base BC produced in D,
prove : BA : AC :: BD : DC.

Algebra.

Questions 1–8 as First Year.

1. What is the rule for writing down the characteristic of the logarithm of any number to the base 10? Prove that

$$\log \frac{1}{m} = -\log m.$$

Show that $3 \log \frac{81}{80} + 5 \log \frac{25}{24} + 7 \log \frac{16}{15} = \log 2$.

2. Find the formula for the amount of a given sum in a given time at a given rate per cent. per annum compound interest. In what time will a sum of money treble itself at 6 per cent. per annum compound interest?

$$\log 3 = \cdot 4771213.$$
$$\log 106 = 2\cdot 0253059.$$

3. Prove that the total number of combinations of n things taken 1, 2, 3, ... n at a time, is $2^n - 1$.

4. If $(1+x)^n = 1 + p_1 x + p_2 x^2 + \quad + p_n x^n$, show that

$$p_1 + 2\frac{p_2}{p_1} + 3\frac{p_3}{p_2} + \quad + \frac{p_r}{p_{r-1}} = \frac{n}{2}(n+1).$$

5. (*a*) $\sqrt{x^2 + 10x + 5} = \sqrt{5x+4} + \sqrt{5x} - 4$.

(*b*) $x^2 - xy = 20$.
$x^2 + y^2 = 26$.

(*c*) Prove that in the equation $x^2 - x = 2 + \sqrt{5}$ one root is the square of the other.

6. A train travelling at the rate of 60 miles an hour meets another twice as long travelling at the rate of 40 miles an hour, and passes it completely in 4½ seconds; find length of the first train.

FIRST YEAR—WOMEN.

Reading.
Penmanship.
School Management.
Composition.
Music.
English.
History.
Geography.
} As First Year—Men.

Needlework.

1. Cut out and make up, in lined paper, the upper half (back and front) of a woman's chemise.

2. Show on the calico supplied how the front opening of a chemise is made. Make a buttonhole.

Domestic Economy.

1. Why must food be masticated, and what is to be understood by 'inability to digest food'?

2. Give reasons in favour of a mixed diet.

3. Compare the cost, wear, and uses of cotton, linen, silk, and woollen fabrics.

4. Explain the different processes of washing (*a*) a calico shirt, (*b*) a flannel dressing-gown, and (*c*) a print dress, respectively.

5. Give a list of the articles required (with approximate cost of each) for comfortably furnishing a working-man's country cottage.

6. Explain what is meant by "inspiration" and "respiration." Describe the uses of these two processes, and the organs concerned in performing them.

Arithmetic.

1. A railway 1,320 chains long has, besides the two terminal stations, other stations at distances of 12 furlongs; find the annual cost of repairs, at the rate of £16 per annum for each 120 yards of road, and £57 for each station.

2. The population of a parish exceeds 3,000, and is less than 4,000; whether the people are arranged in groups of 8, of 9, of 15, of 18, or of 25, 7 always remains over. Find the exact population.

3. Find the greatest and least of the fractions $\frac{3}{8}$, $\frac{8}{20}$, $\frac{23}{48}$, $\frac{18}{28}$.

4. A room, 16 feet square, requires for its walls six pieces of paper 18 yards 2 feet long, and 2 feet broad; find the height of the room.

5. If 1½ be the interest on a £100 exchequer bill for one day in the year 1865, at what rate per cent. per annum is the interest paid?

6. Which of the following stocks is most profitable for investment:—The 3 per cents. at 91½, the 3½ per cents. at 108½, the 4 per cents. at 111? Find the yearly income produced by investing £5,217 16s. 3d. in the most advantageous of the three.

SECOND YEAR—WOMEN.

Reading.
Penmanship.
School Management.
Teaching.
Composition.
Music.
English.
History.
Geography.
} As Second Year—Men.

Needlework.

1. Cut out and make up, in lined paper, a child's pinafore.

2. On the stocking-web material darn a hole half an inch square (common method), and fill in a hole half an inch square with the stocking web-stitch.

Domestic Economy.

1. How should you make (1) beef-tea, (2) chicken broth for the use of an invalid?

2. Explain the terms Interest, Consols, Mortgage, Insurance, County Court.

3. How should you plan a course of 18 lessons for a cookery class consisting of girls of 14?

4. Give an account of the ordinary duties of a housemaid in a family where three servants are kept.

5. By what indications should you detect the onset of (1) measles, (2) smallpox, (3) scarlatina, (4) mumps.

6. Describe how to make tea and coffee, pointing out common errors to be avoided.

Arithmetic.

1. If the larger wheel of a bicycle whose circumference is 8 yds. 0 ft. 5½ ins. makes 200 more revolutions than that of another bicycle in travelling 5 miles, find the circumference of the latter wheel.

2. The periods of three planets which move uniformly in circular orbits round the sun are respectively 200, 250, and 300 days. Supposing relative to each other and to the sun to be given at any moment, determine how many days must elapse before they have again exactly the same relative positions?

3. Reduce 2½ cwts. to the fraction of 4 tons 2 cwts. 14 lbs., and 19½ guineas to the fraction of £14 9s. 3d.

4. What, in common language, is the rate per cent. when it is expressed by the decimal ·045? Find the interest on £1,937 10s. for 6 years at the above rate per cent. simple interest?

5. A railway train has a journey of 65 miles to perform, and ought to perform it in three hours; if its starting be delayed a quarter of an hour, how many miles per hour must it increase its speed so as to arrive at the proper time?

6. A person rows a distance of 1½ miles down a stream in 20 minutes; but without the aid of the stream it would have taken him half an hour. What is the rate of the stream per hour, and how long would it take him to return against it?

NOTES ON NOVEMBER QUESTIONS.—MEN.

Arithmetic.

1. Part of school in first three classes is $\frac{1}{7} + \frac{3}{14} + \frac{5}{126}$.
Part in fourth class, omitting 6, is $\frac{1}{2} \times \frac{40}{63}$.
∴ part of school left when 6 omitted is

$$\frac{40+20}{63} = \frac{20}{21};$$

that is, $\frac{1}{21}$ of number in school is 6, etc.

2. $$E = \frac{\left(\frac{37}{5}\times\frac{37}{5}\times\frac{37}{5}\right) - 27}{\left(\frac{37}{5}\times\frac{37}{5}\right) - 9} = \frac{\left(\frac{37}{5}\right)^3 - 3^3}{\left(\frac{37}{5}\right)^2 - 3^2},$$

from which result follows easily, by using algebraic result of factorising, the differences of cubes and squares. Ans. $8\frac{69}{169}$.

3. 3d. $= £\frac{1}{80}$.
1 franc $= £\frac{1}{25}$.
1 yd. $= \frac{288}{315}$ metres.
Average selling price is $£\frac{7}{25}$.
Cloth bought is $\frac{20000 \times 288}{3 \times 315}$ metres.
Cost is (*a*) Buying Price, £1000;
(*b*) Carriage, £83 6s. 8d.;
(*c*) Duty, $£\frac{512}{5}$.
Total cost, £1,185 14s. 8d.
Selling price, $\left(\frac{20000 \times 288}{3 \times 315} \times \frac{7}{25}\right) = £\frac{5120}{3}$, etc.

4. $\frac{1}{\sqrt{8}} = \frac{\sqrt{8}}{8} = \frac{2{\cdot}8284271}{8} +$
$= {\cdot}3535534 +$.

5. 7·4 — 6s. 8d. = 8d.
£500 assets gives 8d. in £.
And x assets gives 6s. 8d. in £.
$\therefore$ 8 : 80 :: 500 : x;
or £5,000.
Debts amount to $\frac{£5000}{6s.\ 8d.}$ or £15,000.

6. Sum of (A + B)'s ages 10 years ago was (60 — 10 × 2), or 40 years.
10 yrs. ago A's age : B's age :: 5 : 3.
Hence, A's age was $\frac{5}{8} \times 40$, or 25 yrs.
$\therefore$ A's age now is 25 + 10, or 35 yrs.
$\therefore$ B's age now is 60 — 35, or 25 yrs.

First Year—Women.

1. Selling price of 1 ton is 5s. 10d. × 280, or £81 13s. 4d.
Profit on 1 ton is (£81 13s. 4d.) — (£70 + 30s.).
Profit on 1,000 tons is £10,166 13s. 4d.

2. Largest possible class is H.C.F. of 221 and 143, which is 13.
Hence number of classes of boys is $\frac{221}{13} = 17$.
Hence number of classes of girls is $\frac{143}{13} = 11$, etc.

3. $\frac{9}{17} = \frac{9 \div 9}{17 \div 9}$ or $\frac{1}{1\frac{8}{9}}$.
$3\frac{1}{5} = \frac{16}{5} = \frac{16 \div 16}{5 \div 16} = \frac{1}{\frac{5}{16}} = \frac{1 \times \frac{4}{7}}{\frac{5}{16} \times \frac{4}{7}} = \frac{\frac{4}{7}}{\frac{5}{28}}$.
$\frac{5}{9} = \frac{5 \div 9}{9 \div 9} = \frac{\frac{5}{9} \times 100}{100} = \frac{55\frac{5}{9}}{100}$.

4. Cost of square yard of carpet is 4s. 6d. $\times \frac{36 \text{ inches}}{18 \text{ inches}}$, or 9s.
Number of square yards required is £14 8s. ÷ 9s., or $\frac{288}{9}$.
Number of square feet required is 288.
Area of floor, 16 feet × L.
$\therefore$ L = 288 ÷ 16, or 18 feet.

5. Selling price is $\frac{120}{100}$ of cost price.
Allowing 10 per cent., he gets $\frac{90}{100}$ of $\frac{120}{100}$ of cost price, or $\frac{108}{100}$ of cost price.
$\therefore$ gains 8 per cent.

6. Interest for 1870 on £100 at 5 per cent. is £5.
Interest for 1871–75 on £100 at 4½ per cent. is £21½.
Total interest is £26½.
$\therefore$ 26½ : 1760 :: 100 : sum borrowed.
£6704 15s. 2⅔d.

First Year—Men.

Algebra.

See Horobin's Solutions (Gill and Sons) for full solutions.

1. The algebraic proof is true whatever the symbols stand for, and whatever their affection; but in an arithmetic illustration the symbols would have a restricted meaning both as to magnitude and sign.

2. $a^{\frac{5}{2}} + a^{\frac{3}{2}}b - ab^{\frac{3}{2}} - b^{\frac{5}{2}}$.
$2a^3 + 3x^2 - 4x - 1$.

3. Using the bookwork, we get $(5x - 3)(x - 3)$ as an expression divisible by the H.C.F.; but $(x - 3)$ alone will divide both expressions.
$\therefore$ it is the H.C.F.

4. $\frac{7a}{2a - b}$.

5. (*a*) Using detached coefficients, the square root is easily found to be $4x^3 - 3x^2 + 3x - 4$.
(*b*) Expression is $\left(\frac{2}{a - b} + b\right)^2$.

6. (*a*) $x = \frac{a + b}{2}$.
(*b*) $x = 3$, or $\frac{5}{7}$.
(*c*) $x = 10$; $y = 1$.

7. A $= \frac{3}{5}$ of $\{2 \times 100 + 19 \times 20\} = £5,800$.
B $= \frac{4}{5}$ of $\{2 \times 50 + 39 \times 5\} = £5,900$.

8. Let $n = a + b + c$,
and $\frac{n}{3} - a = b - \frac{n}{4}$;
or $\frac{7n}{12} = a + b$,
and $c = n - (a + b)$
$= \frac{5n}{12}$.

Second Year.

Algebra.

1. Log $49 = \log 7^2 = 2 \log 7$
,, $36 = \log 252 - \log 7 - 2 \log 10$
,, $(252)^5 = 5 \log 252$
13 digits.

2. Bookwork.

3. There are five angular points to be combined three at a time.
$\therefore$ No. is $\frac{\lfloor 5}{\lfloor 3 \ \lfloor 2} = 10$.

4. $\frac{1 \cdot 3 \cdot 5 \ldots (2n - 1)}{\lfloor n} 2^n \left(x^n \cdot \frac{1}{x^n}\right)$.

5. (*a*) I regret there was a misprint not corrected. The equation should be
$$\sqrt{x + 10} + \sqrt{x - 10} = \frac{60}{\sqrt{x + 10}};$$
or $(x + 10) + \sqrt{x^2 - 100} = 60$;
or $x = 26$.
(*b*) Subtract (1) from square of (2) giving
$3xy(x + y) = 90$,
Substitute from (2)
$x + y = 11 - xy$,
Then $(xy - 6)(xy - 5) = 0$,
or $xy = 6$ or 5,
$x = \frac{6}{y}$ or $\frac{5}{y}$,
Substituting: $x = 2$ or 3,
$y = 3$ or 2.
(*c*) Let α, β and α_1, β_1 be the roots,
then $\alpha + \beta = -p$,
$\alpha_1 + \beta_1 = -r$,
$\alpha\beta = q$,
$\alpha_1\beta_1 = s$,
$\frac{p^2}{r^2} = \left(\frac{\alpha + \beta}{\alpha_1 + \beta_1}\right)^2$
But $\alpha : \beta :: \alpha_1 : \beta_1$,
or $\left(\frac{\alpha + \beta}{\alpha_1 + \beta_1}\right)^2 = \left(\frac{\beta}{\beta_1}\right)^2$
$= \frac{\alpha\beta}{\alpha_1\beta_1}$
$= \frac{q}{s}$, etc.

6. Let x be length of hill,

$$\frac{x}{2\frac{1}{2}} + \frac{x}{5} = 6,$$

or $x = 10$,

$2x = 20$ miles;

Also $10 : y :: 8 : 1$, where y is height of hill, giving

$y = 1\frac{1}{4}$ miles.

NOTES AND NOTIONS.

BY RICHARD WADDINGTON.

THE Assistants' Conference at Burton-on-Trent was of more than usual interest. The scale of salaries suggested by the National Society to carry out the scheme of the Archbishops' Committee brought forth the natural demand on the part of the assistants for universal School Boards. Whatever may be the policy of expediency pursued elsewhere, the assistants recognise the source of many of their disabilities. That their position would be strengthened by the immediate creation of School Boards in every school district, not even Mr. Jackman and Mr. Thomas would maintain. I take their resolution rather as arising from a natural and justifiable resentment at the treatment meted out in the scheme of the Archbishops' Committee. If the resolution means more than protestation, then the Archbishops' Committee have set rolling an agitation that must not be ignored. So long as the voluntary schools employ cheap teaching power so largely, it is hardly to be expected that the assistants will view the dual system with any evident amount of favour. To ignore or condemn the resolution would be burying the head in the sand to avoid recognising the trend of events.

* * * * *

CAN any practical teacher complain of the resolution after perusing the following figures?

In Voluntary Schools: — Of 1,252 certificated assistant masters only 82 get over £100 a year; of 2,637 certificated assistant mistresses only 103 get over £75 a year.

In Board Schools:—Of 5,376 certificated masters, 2,548 get over £100 a year; of 8,600 certificated mistresses 2,548 get over £75 a year.

The assistants, with these figures before them, can have no special regard for the Voluntary Schools; and the line pursued by leading Churchmen gives little assurance that the future is to be brighter. At Preston the Bishop of Manchester said: 'They were not so much claiming more money as a release from an unscrupulous competition.' Says Canon Scott at Bolton: 'The competition existed solely in the teacher.' And further on 'he advocated limitation of expenditure on School Boards, but this must not be such as would injure the educational interests of the schools. This limitation might take two or three different forms; viz., that the cost of the teaching should not be less or more than a certain sum; and also by requiring the School Board to submit its estimate to be checked both by the Education Department and the County Council.' After that can you wonder that the assistants go for universal School Boards?

MR. MOORE, in his presidential address, reviewed the situation in his usual practical and well-informed manner. Completeness and incisiveness ran through every line of the address and every act of the President. I congratulate Mr. Moore and the Conference. It was fitting that the Conference should honour the Vice-President of the N.U.T. No man has done more to promote the welfare of the assistants than Mr. Macnamara. Although in the *rôle* of friendly critic he has said some hard things about 'sowing wild oats,' yet everybody knew his heart was right, and that his chastening was the outcome of his loving-kindness for the chastised. I knew Mr. Macnamara as an assistant, and I know no man who knows the difficulties of the class teacher better than T. J. Macnamara.

* * * * *

I HAVE said over and over again in these columns that the Voluntary teacher is the bearer of the financial difficulties of the Voluntary Schools. The following table fully proves my contention:—

AMOUNT PER HEAD IN—

	Voluntary Subscriptions and School Fees.		Rates and School Fees.		Difference.		Salaries in Voluntary Schools.		Salaries in Board Schools.		Difference.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s	d.
Birmingham -	5	$10\frac{3}{4}$	18	$11\frac{1}{4}$	13	$0\frac{1}{2}$	25	$2\frac{3}{4}$	37	$1\frac{3}{4}$	11	11
Bolton - -	9	5	19	$2\frac{3}{4}$	9	$9\frac{3}{4}$	28	$1\frac{1}{4}$	36	$0\frac{1}{4}$	7	11
Bristol - -	6	$1\frac{1}{2}$	20	$5\frac{3}{4}$	14	$4\frac{1}{4}$	26	$6\frac{1}{4}$	37	$2\frac{1}{2}$	10	$7\frac{3}{4}$
London - -	14	$5\frac{3}{4}$	35	2	20	$8\frac{1}{4}$	32	$1\frac{3}{4}$	51	$11\frac{1}{4}$	19	$9\frac{1}{2}$
All England -	8	7	18	$11\frac{3}{4}$	10	$4\frac{3}{4}$	29	0	37	$9\frac{1}{4}$	8	$9\frac{1}{2}$

There is the problem in a nutshell. The Voluntary Contributions are less than the amount taken from the Rates by 10s., and the salaries of the teachers account for 8s. 9d. of the missing ten shillings. We hear a good deal of the sacrifices of the managers, but little of the sacrifices of the teachers in Voluntary Schools. Creeds and parties may bark and bite, but our duty is to see that the new grant goes to the relief of the teachers.

* * * * *

EXPERIENCE points to the necessity of effectively safe-guarding that increased financial aid shall not lead to a reduction of income from subscriptions. Since the introduction of the Fee Grant in 1891, the income from Fees and Fee Grant has perceptibly increased, while during the same period the Voluntary Contributions have decreased. Take the schools of the Church of England from '91 to '94.

	s.	d.	
Increase of Grants—			
Fees and Fee Grant - -	1	$0\frac{1}{4}$	per head.
Ordinary Grant - - -			
Science and Art Grant -		6	"
Increase of - - -	1	7	
Decrease of Voluntary Contributions - - - -		$5\frac{3}{4}$	"
Net increase of income -	1	$1\frac{1}{4}$	"
Net increase of expenditure -		$5\frac{1}{2}$	"
		$7\frac{3}{4}$	"

TAKE the Roman Catholic Schools for the same period :—

	s.	d.	
Increase of Grants—			
Fees and Fee Grant - -	11		per head.
Ordinary Grant - - -	3		,,
Science and Art Grant -	2		,,
Increase of - - -	1	4	
Voluntary Subscriptions decreased - - - -	6		,,
Salaries decreased - - -	4		,,

* * * * *

IT is futile to ignore these facts at this juncture. I am for a Dual System, if this means two good systems; but I am against any system that means badly-paid teachers, over-worked and much harassed. I am not so fastidious as to the nomenclature, so long as the system or systems are real and in earnest. A perusal of the Blue Books does not always disclose the highest salaries where there is the greatest amount of Voluntary Contributions. Here is a school, and it does not stand alone :—

Average attendance, 955.				
Grant - - -	£1,398	3	0	
Voluntary Contributions - - -	634	15	3	
Fees paid by scholars		3	6½	per head.
Total -	£2,289	18	3	
Salaries - - -	£1,230	4	11	
Repairs, Furniture, Rent, Rates, Fuel, and Cleaning -	965	8	4	
Books - - -	184	2	3	

This school spends 25s. 9d. per head on salaries, and 20s. 2d. on repairs, furniture, rent, rates, fuel, and cleaning. The post of school cleaner must be much better, from a pecuniary point, than that of school teacher in this school.

* * * * *

THE report of the Secondary Education Commission is an interesting, if voluminous, document. One can't help sympathising with Mr. Yoxall's plea for the creation of an Education Board covering suitably wide area to control all forms of education in each district. The more one realises the condemnation of the Commissioners of the system of the payment and control of primary education, the more the regret grows that such a recommendation was not included in the report. So much for the betterment of the schools of the workers might accrue from such an effort. It is impossible to read without a gladdening of the spirit the part dealing with the inspection of schools. Bearing in mind the appointment of Messrs. Roberts, Campbell, and Davidson, it is interesting to read the Commissioners' conclusion :—

'In selecting persons for these posts, great weight ought to be given to previous experience in teaching; and duly qualified women should be chosen where there is likely to be sufficient work for them. The appointment of such inspectors should, we think, be made independent of any limit of age.'

After this the Education Department will surely seek to obtain inspectors who know something about Primary Schools.

* * * * *

THE dinner to our two M.P.'s marked a stage in the history of Unionism that has been the cherished aim of the N.U.T. for the last quarter of a century. That there should be rejoicing over the accomplishment was fit, right, and our bounden duty. To Mr. Ellery's year there have fallen good things in profusion. To be president of a Union that numbers two M.P.'s among its leaders is a matter of no small gratification. Messrs. Gray and Yoxall bore their blushing honours with fitting grace and modest pride. The dinner was admirable, the music excellent, and the speeches in keeping with both. Mrs. Macnamara, with that self-denial which has given so much of her husband's time and ability to the Union, filled the post of accompanist to those who so sweetly discoursed vocal music between the 'toasts.' It was a memorable event, and the assembly was worthy of the occasion. It was a meeting of patient workers to celebrate the success of workers in gaining entrance into the arena wherefrom can come much that will improve the lot of the teacher and taught.

* * * * *

WHEN are we to see that Illustrated Syllabus in Drawing? It was due last August, but is still in the hands of the printer. However, the syllabus already to hand needs no illustration. Day by day, the teacher is busy illustrating its utter impossibility within the four walls of the school. The Executive of the N.U.T. is determined not to let the matter rest where it is, and is asking for a deputation to be received to plead for a more rational and much reduced allotment of work. The time has come when there must be no mistake about the protest. Associations to the right and to the left protest with unfailing unanimity against the excessive requirements. Never yet have I found a dissentient voice raised against the protest. We are told of teachers who accomplish the work with ease, but, I must say, they exhibit a remarkable desire to hide their light under a bushel at the numerous meetings I attend. I am hoping that even the Science and Art Department will awake to the necessities of the children in this matter of drawing.

* * * * *

MY school year ends with January, and in granting certificates of previous due attendance for full time employment between 13 and 14, the labour is increased by the certificate requiring the attendances from January 1st to December 31st, while the registers give the totals from February 1st to January 31st.

I wrote to Sir George Kekewich pointing out the difficulty, and suggesting that in schools where Inspection was substituted for Examination under Art. 84, and the consequent abolition of schedules requiring the individual attendances for the school-year, there was no reason for the register commencing at any particular date, as the figures for Form IX. are taken from the Summary. I asked if there would be any objection to the registers opening and closing

with the civil year. To this Sir George Kekewich replied as follows :—

Education Department,
Whitehall.
Nov. 9th, 1895.

DEAR MR. WADDINGTON—

There is nothing in the regulations of the Department which requires a single set of registers to be in use throughout the school-year; or which, therefore, prevents managers from arranging that the school registers should be closed, and a new set brought into use, at the end of the civil year.

It will, of course, be as a general rule most convenient to Managers and Teachers, as well as to the Department, that sets of registers should be closed at the end of the school-year.

But when, as in the case of your school, owing to exceptional circumstances, the balance of convenience, at any rate to the Teacher, appears to be in favour of closing the registers at the end of the civil year, I know of no sufficient reason why that course should not be adopted.

I am, yours very truly,
G. W. KEKEWICH.

* * * * *

No complaint could possibly be made as to the completeness of the educational programme of the new Vice-President. The age for half and whole time employment is to be raised, and the standard of exemption abolished. What is to be the substitute for standard? Is Sir John to be the author of Age and Attendance? Whatever the substitute, he cannot lay his hand to a more fitting work than the regulation of child labour. But the question of superannuation is not to be ignored, for the Vice-President hopes to bring the problem to a solution. The increased grant to all schools is mentioned last, although it is almost certain to come first in the Government endeavour. I think he might, if he dared, have announced that the Cabinet had agreed on the increased aid to be given—but that is a Cabinet secret. Well might Mr. Stanley characterise Sir John's speech as 'progressive.' The new Vice-President is a clear-headed, practical politician, without a pocket full of 'fads,' and, like Sir William Hart Dyke, he may do more than those from whom we expected much on account of their educational leanings.

MENTAL ARITHMETIC FOR THE STANDARDS.

BY T. B. ELLERY, F.R.G.S.,
President of the National Union of Teachers.

'Mental work will strengthen the power of computation, and facilitate the handling of simple problems.'—MR. CODD, H.M.I.S.

Sixth Paper.

STANDARD III.

LET us first of all look at the arithmetic set for children in this Standard.

Scheme A.—The four simple rules to short division as in Standard II., and long division. Addition and subtraction of money.

Scheme B.—Simple rules and compound rules (money). Divisors and multipliers not exceeding 99. No number higher than 99,999 to be employed in the question or required in the answer. Sums of money in the questions and answers not to exceed £99.

Let me also give paragraph 26 of the *Instructions*, so that all necessary information may be at hand :—

Mental arithmetic is a class exercise, and may often be satisfactorily tested by requiring the teacher of the class to give a few questions in your presence, and by adding at discretion some questions of your own. The object of this exercise is to encourage dexterity, quickness, and accuracy in dealing with figures, and to anticipate, by means of rapid and varied oral practice with small numbers, the longer problems which have afterwards to be worked out in writing. It is obvious that this general object cannot be attained if the exercises are confined to a few rules for computing 'dozens' and 'scores,' such as are often supposed to be specially suited for mental calculation. A footnote to Schedule I. calls your attention to the importance of rapid addition. Occasionally a long column of figures may be written in the sight of the scholars, and they may be required to name in quick succession the results of each addition as the inspector or teacher points to the several figures in any order. Oral practice should be given in all the ordinary processes of arithmetic, and should be so varied as to furnish as many different forms of exercise as possible in concrete as well as abstract numbers, and in the fractional parts of money, weights, and measures. In the last quarter of the school year it should deal chiefly with the work of the next higher standard. It is often found to be a help in calculation if the dimensions of the school-room, the playground, and the desks, and the weight of a few familiar objects are accurately known, and if the figures recording these particulars are easily accessible, and are occasionally referred to as standards of measurement.

1. *Money Table.*

Our pupils must be familiar with all the coins, and be able to make simple calculations with them. We have already practised the half-crown table (which should be well known), and we will now continue the practice, and introduce other operations.

1. How many half-crowns in 15s.? in 17s. 6d.? in £1? in £2? in £1 10s.?

2. A man works for 10 days at a florin a day. He is paid in half-crowns. How many half-crowns does he receive?

3. Take 7 half-crowns from 8 florins.

4. How often is 2 half-crowns contained in 15 florins?

5. What must you add to 9 half-crowns to make £2?

6. A woman bought 8 lb. of butter at 1s. 3d. a lb. How many half-crowns did she spend?

7. Take the sum of 6 florins and 6 half-crowns from 30s.

8. How many £'s, etc., in 50 guineas? 60 guineas? 45 guineas? 75 guineas?

9. How many half-guineas in £6 6s.? £9 9s.? £15 15s.?

10. What must you add to the sum of 7 half-crowns and half-a-guinea to make £2?

(*Continued on page* 308.)

"THE PRACTICAL TEACHER" WALTZ.

COMPOSED BY H. BERKELEY SCORE.

(Composer of "The Death March," "Royal Gavotte," &c., &c. Organist of the Private Chapel of The Right Hon. The Earl of Latham, G.C.B.)

Introduction.
Andante.
f Ben marcato.
ff rall.
No. 1.
Tempo di Valse.
Dolce.
p
mf
Love! is it a flow - - er? Love! is it a theme?.....
poco cres.
p
Love! is it a plea - - sure? Love! is it a dream?.....
mf poco a poco cres - - - - - - - - cen - - - - - - - - do.
True love is sweet mu - - sic Sung by the soul.....
f
mf
p
Love is the fee paid At Cu - - pid's dear toll.....

Tutti.
ff
Ped.
FINE.
Risoluto. 2nd time octave higher.
mf
f
D.C. from 8¹ after repeat.

No. 2.
Con anima.
8va p
cres.
ff
mf
cres.
ff
mf
f
mf
cres.
f
mf
cres.
f
mf
D.C. from 8va
p
Energico.
8va ff
mf
ff
mf
ff
D.C. from 8va

Grandioso.
No. 3.
8va f
Ben marcato il basso.

Ben marcato il basso.
D.C. from 8
No. 4.
Con grazia.
8 p
cres. . . . f mf p
poco a poco cres. . . . . f
dim. . . . . p
f
D.C. from 8

Con fuoco.
Con leggierezza.
Con fuoco.
Con leggierezza.
D.C. from 8va after that follow on Coda.
CODA.
meno mosso.
Tempo di valse. Dolce.
Love! is it a flow - - er? Love! is it a theme?.....
poco crescendo.
Love! is it a plea - - sure? Love! is it a dream?.....
poco a poco crescendo.
True love is sweet mu - - sic Sung by the soul,.....

f
Love is the fee paid At Cu - - pid's dear toll.....
TUTTI.
ff
Ped.
ff
mf
Risoluto. 2nd time octave higher.

ff
fff
Ben marcato il basso.

(*Continued from page 299.*)

11. I paid away 5 florins, 5 half-crowns, and 5 sixpences. How many *crowns* did I spend?

12. I had 2 guineas in my purse. I spent first £1 5s., then 3 florins, and then 3s. What sum was left?

2. *Easy Fractions in Money.*

13. One-half of £1? One-fourth of £1? Two-fourths of £1? Three-fourths of £1?

14. Of £1. One-fifth? Two-fifths? Three-fifths? Four-fifths?

15. Of 10s. One-fourth? Three-fourths?

16. Of £2. One-fifth? Three-fifths? What must you add to two-fifths of £2 to make a sovereign?

17. Of 16s. One-eighth? Two-eighths (=¼)? Five-eighths? Seven-eighths?

18. Of 30s. One-third? Two-thirds? What must you add to two-thirds of 30s. to make 5 crowns?

19. Of 24s. One-sixth? Two-sixths (=⅓)? Three-sixths (=½)? Four-sixths (=⅔)? Five-sixths?

20. Of 5s. One-tenth? Three-tenths? Five-tenths? Seven-tenths?

21. Of a florin. One-twelfth? Two-twelfths? Five-twelfths? Three-twelfths? Seven-twelfths? Four-twelfths? Six-twelfths?

22. Add one-fifth of a crown to two-thirds of 12s.

23. By how much does five-eighths of a sovereign exceed 5 florins?

24. How often is one-third of 12s. contained in £2?

3. *Easy Fractions in Weights and Measures.*

The pupils should learn such easy portions of the weights and measures tables as:—

(*a*) 16 oz. = 1 lb., 112 lb. = 1 cwt., 20 cwt. = 1 ton.

(*b*) 12 inches = 1 foot, 3 feet = 1 yard.

(*c*) 60 seconds = 1 minute, 60 minutes = 1 hour, 24 hours = 1 day, 7 days = 1 week, 52 weeks = 1 year, 4 weeks = 1 month, 12 months = 1 year, 365 days = 1 year.

(*d*) 2 pints = 1 quart, 4 quarts = 1 gallon, 2 gallons = 1 peck, 4 pecks = 1 bushel.

If *all* the foregoing cannot be mastered at this stage, a few at least should receive attention.

25. One-half of 1 lb.? One-fourth? Three-fourths?

26. How many ounces is three-fourths of 1 lb. less than 1 lb.?

27. Add one-fourth of 1 lb. and one-half of 1 lb., and take 7 oz. from your answer.

28. How many inches in 2 feet? in 4 feet? in 6 feet?

29. How many inches in a yard? in half-a-yard? in one-fourth of a yard?

30. How many inches in the sum of three-fourths of a yard and half-a-foot?

31. One-half of an hour? How many minutes in one-fourth of an hour?

32. How many minutes must you add to three-fourths of an hour to make 1 hour?

33. How many days in one-seventh of a week? Three-sevenths?

34. Add one-eighth of a day to three-fourths of a day. (Answer in hours.)

35. How many months in the sum of one-sixth of a year and one-half of a year?

36. How many pints in a quart? in a gallon? How many pints in three-eighths of a gallon?

37. How many pints are there altogether in one-fourth of a gallon, + one-half of a gallon, + 1 pint?

38. How many pints in one-fourth of 2 gallons?

39. How many inches in one-sixth of a yard?

40. How many inches must you add to one-fourth of a yard to make half a yard?

4. *General.*

41. A desk is 6 feet long. How many boys can be seated at it if each boy is allowed 9 inches?

42. A man earns 4s. 6d. a day. How much will he earn in a fortnight, not counting Sundays?

43. Slates are bought at 2s. a dozen. Find cost of 13.

44. How many minutes from 2.30 in the afternoon until 4 o'clock? from 4 o'clock until 6.30? from 5.30 until 8 o'clock?

45. How many hours in 5 days? in 6 days?

46. How many days in 3 weeks? in 7 weeks? in 12 weeks?

47. What must you add to the fifth part of 200 to make the eighth part of 400?

48. What must you multiply 8 by to obtain 16×11?

49. What is the nearest number greater than 47 which is exactly divisible by 11? *Rule*—Divide; add difference between divisor and remainder to dividend.

50. I gave a half-penny to all the boys in a class, and gave away altogether 1s. 9½d. How many boys in the class?

51. If a gallon of milk cost 1s. 4d., what would you pay for a pint?

52. If 2 lb. of tea cost 6s., what will you pay for 8 oz.?

53. Find the cost of 1 cwt. of rice at a penny a lb.

54. If 2 oz. of tea cost 2½d., what would a lb. cost?

55. Take 14s. 3½d. from 7 half-crowns.

56. How many shillings altogether in the sum of one-fifth of a £, + one-fourth of a £, + one-tenth of a £?

57. If a boy's step measures 2½ feet, how many steps will he take in 20 feet?

58. How many dozens in 12 score? How many score in 10 dozen?

59. Take the half of 3s. 6d. from the fourth of 18s.

60. How many pence in the sum of a florin, 2 sixpences, and 8 farthings?

5. *Simple Problems.*

61. I earn 18s. a week and spend 12s. How long shall I take to save 2 guineas?

62. I had 5 crowns in my purse. I spent first 14s. 6d., and then 3s. 6d. How much left?

63. A man had 400 apples in a bag. He kept one-half for himself, and divided the remainder equally among 10 men. How many did each man receive?

64. A man pays a penny a mile when travelling by rail. He gave half-a-sovereign for his ticket and received 6s. 6d. change. How many miles did he travel?

65. A man had a guinea. He gave 4s. 6d. to one boy, and twice that sum to another boy. How much had he left?

66. A boy lost one-half his marbles, and then 10 more. He had then 16 remaining. How many had he at first?

67. Divide 2s. between two boys, giving one as much again as the other. How much each?

68. Divide 15s. between two boys, giving one a shilling more than the other. How much each?

69. A train travels at the rate of 40 miles an hour. How long will it take to run 200 miles, allowing for half-an-hour's stop on the way?

70. How many shillings can a man save in 3 weeks, if he earn £2 a week and spend 30s.?

71. A train runs 80 miles in two hours. How far does it run in 30 minutes?

72. I buy 10 lb. of apples at 3d. a lb. What part of £1 do I spend?

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Head Master of the Belvedere Pupil Teachers' Centre, First on Scholarship List, Author of 'Scholarship School Management.'

PUPIL TEACHERS' COURSE.

SCHEME OF WORK FOR THE MONTH.

WORK TO BE PREPARED.

A.—*English.*

First Year.

1. Learn a classification of the Pronoun with definitions of the various classes and examples. Note particularly the difference between Reflexive and Emphatic Pronouns.

2. The Latin suffixes:—*-ade, -aye, -an, -ain, -ant, -ent, -ance, -ancy, -ence, -ency, -ary, -ar, ory, -ery, -er, -ate, -cle, -el, -cel, -el, -or, -elle, -let, -ess, -ice, -ise.*

3. Learn 10 Roots and meanings per week.

Second Year.

1. *The Pronoun.* Classification, definition, derivations of the Personals. Distinguish Emphatic and Reflexives. Note also the differences in meaning between some pairs of Indefinite Pronouns, *e.g.*, *another* and *the other*; *every* and *each*; etc.

2. Learn one quarter of the Latin Prefixes.

3. Learn 15 Roots and meanings each week.

Third Year.

1. English Literature. The chief writers and the works from 1485–1555.

Note the rise of the Drama, the first Comedy, and the first Tragedy, the various editions of the Bible, the impetus given to literature by the revival of learning, and the religious disputes. More's *Utopia* should be specially studied.

This must be carefully prepared, the authors' style, works, and sketch of their lives entered in a note book.

2. Learn 20 Roots and meanings each week.

B.—*Arithmetic.*

First Year (*Boys*).

Lock. Work Examples XXXVIII.–XLVI.

Note particularly the theory of Fractions. Learn definitions of various kinds, and be prepared to draw diagrams, proving Addition, Subtraction, and Multiplication.

Girls.—'Girls' Arithmetic' (Dixon and Beach). Work Example IX. (Bills of Parcels).

Second Year.

Boys.—Lock. Work Example LXX. (Miscellaneous Examples on Fractions).

Girls.—'Girls' Arithmetic.' Work Examples XVI. to XIX.

Third Year.

Boys.—Lock. Work Examples CXXVII. to CXXX.

Girls.—'Girls' Arithmetic.' Work Examples XIX. to XXI.

C.—*Music.*

First Year.—Accent, two- three- and four-pulse measures.

Second Year.—Six and nine-pulse measures in their various forms.

Third Year.—Relative pitch of keys.

(Note.—This is best understood by constructing a modulator illustrating four sharp and four flat removes.)

D.—*Spelling.*

Learn 200 words from 'Words Commonly Misspelt' (1st Series), or any good list. Test frequently by dictation.

E.—*Geography.*—GERMANY AND RUSSIA.

Germany.—Physical Features, Climate, and Productions.

The term Germany should be understood to mean the German Empire. The country inhabited by German-speaking people has never been *one* country, but rather a collection of independent States; and although the title of *Emperor* has been in use for centuries, his power was more nominal than real.

The League of German States, which was formed in 1816, included nearly the whole of modern Germany and Austria (not Hungary) as well, and lasted fifty years. The fight between Prussia and Austria in 1866 resulted in the formation of a new League, of which Prussia was the dominant Power, and from which Austria was excluded. The Franco-Prussian War of 1870 resulted in the annexation of Alsace-Lorraine (from the French), and the establishment of the Empire under the King of Prussia, who takes the title of German Emperor. The Empire consists of four Kingdoms, seven Grand Duchies, four Duchies, seven Principalities, three Free Cities (Hamburg, Lubeck, and Bremen), and one Imperial Territory (Alsace-Lorraine).

Relief.—North Germany lies low, and forms part of the Great European Plain. South Germany is mountainous. Chief mountains: Vosges, Black Forest, Rhine Alps, Hartz Mountains, Thuringian Forest, etc.

Rivers.—Rhine (Moselle, Neckar, Main, etc.), Ems, Weser, Elbe, Oder, Vistula, Pregel, Niemen, and the Upper Danube.

(The course of the Rhine must be very carefully prepared—it is a very favourite topic for a question.)

Climate.—Ranges from warm in South (grapes ripen in open air), to cold on Baltic shore.

Productions:—

(*a*) Mineral.—Coal and iron abundant. The Erz Gebirge (Ore Mountains) and Hartz Mountains yield zinc, lead, cobalt, nickel, and tin, arsenic, and antimony. Salt and sulphur are also found.

(*b*) Vegetable.—Wheat, oats, rye, barley, hemp, flax, beetroot, tobacco, and hops. The vine is largely cultivated in the Rhine Valley. The forests of chestnut, oak, beech, fir, and pine, cover nearly one-fourth of the country, and are largely used for charcoal burning, timber, toy-making, etc. *Amber* from Baltic shore.

(*c*) Animal—Wild. Wolf, wild boar, fox, weasel, etc.

Domestic, etc.—Horses, cattle (in large quantities exported to England), pigs (especially in Westphalia—noted for hams), sheep, goats, and the common birds and smaller animals of the temperate zone.

Industries, Towns, etc.

Industries:—

(*a*) Agriculture.—Wheat and cereals, beetroot, tobacco, and wine.

(*b*) Mining.—Silver, iron, lead, coal, zinc, copper.

(*c*) Cotton, woollen, and silk goods.—Breslau, Cologne, Dusseldorf, Elberfield, Crefield, Magdeburg, Cassel, etc.

(*d*) Machinery, guns, manufacture of chemicals.

(*e*) Wine, beer (Bavaria), earthenware (Meissen), toys (Nuremburg).

(*f*) Glass manufacture in all branches.

Towns:—Ports: Cuxhaven, Hamburg, Altona, Kiel, and Lubeck, Stetten, Dantzig, Memel. Berlin (fine city and buildings, busy manufacturing centre, chief centre of trade, etc.), Gottingen (University), Hanover, Brunswick, Dresden (art galleries, porcelain—manufactured at Meissen), Leipzig (manufactures—cotton, silk, woollen goods; noted for books), Magdeburg (strong fortress), Breslau, Frankfort, Munich (jewellery, lace, paper, leather), Augsburg, Cologne (fine cathedral), Frankfort-on-Main, Elberfield (Birmingham of Germany), Nuremburg (toys and watches), Stuttgart, Baden, Mayence, Strasburg, Metz, etc.

Education.—A nation of readers and thinkers.

Government.—Each State has its own Parliament, sending representatives to the Imperial Parliament—Reichstag or Diet.

RUSSIA.

Physical features and productions. Chief points:—

1. Boundaries and extent—2,095,000 square miles.

2. Coast line, etc.:—

(*a*) *Arctic.*—Low-lying Tundras. Swamp, and frost bound. Kara Sea, Vaigatz I., Novaia Zembla, Kolguev I. (visited by whalers and sealers), White Sea (frost-bound greater part of the year).

(*b*) *Baltic.*—Gulf of Bothnia, Gulf of Finland, Gulf of Riga, Aland Islands, Dago, and Osel.

(*c*) *Black Sea.*—Crimean Peninsula, Sea of Azov.

(*d*) *Caspian.*

3. *Elevation.*—For the most part immense plains. Tundras in North, Steppes in South, Blacklands in Central Belt. Caucasus Mountains, with Elburz, Kashtan Tau, and Kasbek. Valdai Hill. Urals.

4. *Rivers*:—

(*a*) Arctic Basin.—Petchora, Mezen, Dwina.

(*b*) Baltic Basin.—Neva, Duna, Niemen, and part of Vistula.

(*c*) Black Sea.—Dniester, Bug, Dnieper, and Don.

(*d*) Caspian.—Volga. Chief tributaries, Oka and Kama. Ural.

5. *Productions*:—

(*a*) Animal.—Horses, cattle, sheep, goats, and pigs; reindeer in north, camel in south; bear, wolf, and fur-bearing animals. Tallow, hides, fur, bristles, hair, etc., exported.

(*b*) Mineral.—Urals, very rich; gold, silver, platinum, iron ore, and malachite; petroleum round Baku on the Caspian; granite and salt.

(*c*) Vegetable.—(1) North: Lichens, mosses, dwarf birch, and willow. (2) Barley, oats, wheat, rye, hemp, flax, hops, tobacco, beetroot, and temperate fruits in the Blacklands. (3) Vine, mulberry, tobacco, maize, melons, etc., in south.

(N. B.—Forests are very extensive, covering nearly one-half of the country.)

6. *Climate.*—Continental, and one of extremes. In summer the heat in centre and south is intense; in winter the whole country is frost-bound, even the ports on the Black Sea being frozen up.

Industries:—

(1) Agriculture and Cattle-rearing.—By far the larger proportion of people are engaged in this pursuit, the chief objects of culture being: Wheat and other cereals, flax, hemp, linseed, beetroot, etc. The cattle give hides, tallow, leather, bristles, hair, glue, etc.

(2) Mining.—A growing industry. The Urals being particularly rich in platinum, malachite, etc.

(3) Fishing.—The Black and Caspian Seas. Sturgeon for isinglass and caviare.

(4) Manufactures.—Small compared with extent and population. Silk, cotton, and woollen goods, leather, spirits, sugar, cutlery, paper, etc.

(5) Forestry.—The export of timber is large. Pearl ash, tar, etc., is prepared.

Towns:—St. Petersburg (fine building—manufactures), Moscow (Kremlin and manufactures), Archangel (White Sea port), Abo, Helsingfors, Cronstadt (strong naval station guarding the capital), Revel and Riga (Baltic ports), Odessa (great Black Sea port—exports wheat from Blacklands), Kherson, Sebastopol, Taganrog, Batoum, Baku, Astrakhan, Nijni Novgorod (great annual fairs), Perm, Samara, Saratov, Orenburg (trade centre), Kharkov, Kiev (ecclesiastical capital), Warsaw, Wilna, etc.

(These should be entered in map. Position and particulars about each learnt.)

People.—Mostly Slavs.

Education.—The upper classes are highly educated, the poor but little; but as education has recently been made free and compulsory, it will probably advance.

Religion.—Mainly Greek Church, also Catholics, Lutherans, Jews, etc.

Government.—Absolute monarchy. The 'Czar of all the Russias' is absolute, but is assisted by various councils. The country is divided into governments, and these again into districts.

Practise memory maps regularly.

F.—*History.*

Henry VI., Edward V., and Richard III.

Henry VI.—1422–1455.

Henry was only an infant when he succeeded to the throne. During his minority John, D. of Bedford, was Regent; Humphrey, D. of Gloucester, Protector in England; and the Royal power was placed in the hands of a committee, of which Gloucester was chairman.

French affairs:—

Henry VI. assumed the title King of France, and Bedford was entrusted with the conduct of the French war, which was opened by those who disliked the idea of an English baby Prince being King of France. Up to 1428—the siege of Orleans—the English cause was successful; but after that, owing largely to the instrumentality of Joan of Arc, the Maid of Orleans, and the death of Bedford, the French gradually recovered the whole of their country until only Calais was left to the English.

Home affairs:—

This was a period of aristocratic factions and generally weak rule. Gloucester, the popular leader, was opposed to Beaufort, Bishop of Winchester, the head of the Court party.

1442.—Henry came of age, and ruled with the advice of Beaufort, whose influence superseded Gloucester's. The latter died in 1447, and shortly after Beaufort followed him. Suffolk, who had risen into importance after the King's marriage with Margaret of Anjou, was held responsible for the loss of the French provinces, was banished and murdered at sea. The rival leaders then were Richard, Duke of York, and Somerset. In 1453 Henry went mad, and York was appointed Protector, and Somerset was imprisoned. The next year the King recovered, York was dismissed, and Somerset released. The Duke of York then raised an army and marched on London, and the Wars of the Roses commenced.

Wars of the Roses—

Causes:—

1. The jealousy of the great barons, and the indecent scramble for power.
2. The weak rule of Henry VI.
3. The antipathy to Margaret of Anjou.
4. The existence of a powerful leader—Richard, Duke of York, who thought he had a better right to the throne than the King himself.

The Yorkshire Claim:

A genealogical table, showing the descent of the Yorkist and Lancastrian families, must be prepared and carefully learnt.

Briefly: Richard, Duke of York, was, through his father, descended from Edmund, fifth son of Edward III., through his mother, from Lionel, Duke of Clarence, third son of Edward III.; while Henry VI. was descended from John of Gaunt, fourth son of Edward III. The Duke of York was thus, on one side, of an older branch than the King. He was also allied, by marriage, with the Nevilles, who were most powerful.

Battles:—

1455. St. Alban's. Yorkists victorious.
1459. Bloreheath. ,, ,,
1460. Northampton. ,, ,,
1460. Wakefield. Lancastrians victorious. Duke of York killed.

1461. Mortimer's Cross. Yorkists victorious.
1461. St. Alban's. Lancastrians victorious.
1461. Towton. Yorkists victorious.
1464. Hedgeley Moor and Hexham. Yorkists victorious.
1471. Barnet. Yorkists victorious.
1471. Tewkesbury. Yorkists victorious.

Note the following :—

The Wars of the Roses, their character and results :—

It is a common mistake to suppose that the whole of the nation was involved in these sanguinary contests ; but this is not so. The war was carried on by the great Barons and their armed retainers, and the general commons of the country pursued their usual avocations with less interruption, perhaps, than would have been received in time of peace. The results briefly were :—

(*a*) The final Extinction of the Feudal System. The loss of life among the barons and their retainers was enormous, and practically exterminated the powerful houses, which had kept up semi-regal state. One feature of the struggle, which is most terrible, is the ferocity with which both parties took revenge for the deaths of kinsfolk. This introduction of personal feud into a political contest accounts for the fierce contests and great loss of life. Those barons who still remained were so impoverished that they were glad to sell their estates and settle down as country gentry. Some even had to fly the country, and gained precarious livings by any menial work.

(*b*) The growth of commercial prosperity and enterprise. The great towns did well out of the contest, by obtaining concessions from both parties.

(*c*) The rise of a new nobility. Henry VII., on his accession, was able to rule quite absolutely. There were no great barons to hold him in check, and he took care that they did not regain their lost power. The new men were personal friends, who dared not oppose him.

This period is the closing scene of the 'Middle Ages,' or 'Dark Ages,' when brute strength was the only law of right. Henceforth a new era. Modern history starts, when intellect and mental ability were placed before rude strength and savagery.

Edward V. and Richard III., 1483–1485.

Chief points :—

Richard's means of obtaining and securing the throne ; Buckingham's rebellion ; abolishment of Benevolences ; Earl of Richmond's invasion and Battle of Bosworth. Note that Richard III. was a most able ruler and soldier, and probably, had the throne come to him in a quiet and legitimate way, would have made a great king. He certainly was not the fiend portrayed by Shakespeare.

Learn the following note :—

Advances of the Constitution under the Lancastrians and Yorkists.—As the house of Lancaster reigned solely by the choice of the people and sanction of Parliament, they seldom, if ever, ventured openly to resist the powers of the Commons, who took advantage of the circumstances to make many advances, the chief of which were :—

1. They maintained and completely established their exclusive right of taxation.
2. They controlled public expenditure, voted their supplies for special purposes, and saw that they were properly spent.
3. They made supplies depend upon redress of grievances.
4. They controlled the king's household expenditure.
5. They established more fully the fact that laws can only be made by the consent of King, Lords, and Commons.
6. They began to give advice on matters of foreign policy.
7. They maintained the right to impeach bad ministers, to freedom of speech, and freedom from arrest.

G.—*Euclid.*

Second Year.—Propositions 7–12, Book I., and two deductions per week.

Third Year.—Book I., Propositions 33–36, and two deductions per week.

H.—*Algebra.*

Third Year.—Read Chapters VIII.–X., 'Scholarship Algebra,' and work all examples thereon. Be particularly careful with the Factors, a proper understanding of which is essential to future success.

I.—*Teaching.*

Second Year.—Finish the subject of Teaching Reading. ('Scholarship School Management'), and look through the questions on Reading at the end of the book.

Third Year.—The teaching of History. Look up the requirements in the New Code, the remarks in Instructions to Inspectors, and prepare suitable lists of Stories and Biographies.

Test Questions.

1. *Penmanship.*—Write as specimens of—

(*a*) Large-hand :— Elementary, Fyzabad, Geographical, Hyderabad.

(*b*) Small-hand :—

'And out again I curve and flow
To join the brimming river.'

(Special care should be taken with this subject—it is too often a very weak one with P.T.'s. Five minutes daily copy from a given model will be of great assistance.)

2. Write an essay each week, selecting from the following topics :—

(1) Our Food Supply ; (2) Contrast between Present Time and Commencement of Century ; (3) The Effect of Printing on Man ; (4) A Rainy Day ; (5) English Sports.

3. *Notes of Lessons.*

First Year Pupil Teachers should write outline notes ; Second and Third Years full notes :—

(1) The Water we Drink ; (2) Shoes ; (3) Daisies ; (4) A Railway Ticket ; (5) A Reading Lesson ; (6) Bread ; (7) Ivory ; (8) The Goat.

(N.B.—A criticism lesson should be given once a week, and the criticisms entered in a book kept for that purpose. There are many such books published.)

4. *First Year.*

(*a*) Define and give examples of Nominative Absolute, Adverbial Object, Cognate Object, Factitive Object.

(*b*) Explain the meaning of the suffix in the following words :—*Shorn, southern, manifold, shamefaced, reckless, righteous, quarrelsome, cleanse, fatten.*

(*c*) Analyse the following passages, and parse the words in italics :—

(i.) *Bounded* the *fiery steed* in air,
The rider *sat erect* and fair ;
Then *like* a *bolt* from steel cross-bow
Forth launched, *along* the plain they go.

(ii.) A *widow* bird sat *mourning* for *her love*
Upon a wintry *bough ;* the frozen wind crept on *above*,
The *freezing* wind *below.*

(iii.) *But brutal* force and savage strength,
To art and skill *must yield.*
Sir Valentine *at length prevailed*,
And won the well-fought field.

(iv.) By torch and trumpet *fast arrayed*,
Each horsemen drew his battle blade,
And *furious* every charger neighed
To join the dreadful *revelry.*

Second Year.

(*a*) Give the meanings of the prefixes in the following words :—*Collide, countenance, demigod, efface, manufacture, omniscient, pellucid, redolent, purpose.*

(*b*) What is meant by Mood. Distinguish clearly between the Indicative, Conditional, and Subjunctive Moods.

(*c*) Paraphrase and analyse the following passages, and parse the words in italics :—

(i.) The English shafts in volleys *hail'd*,
In headlong charge the horse assail'd ;
Front, *flank*, and rear, the squadrons sweep
To break the Scottish *circle* deep
That fought around their king.
But yet, though thick the shafts as *snow*,
Though charging knights *like* whirlwinds go,
Though bill-men ply the ghastly blow,
Unbroken was the ring.

(ii.) *Such* the bard's prophetic words,
Pregnant with celestial fire,
Bending *as* he swept the chords,
Of his sweet *but* awful lyre.
She, with all a monarch's pride,
Felt them on her bosom *glow ;*
Rushed to battle, fought and died,
Dying hurled them at the foe.

Third Year.

(*a*) Say what you can of Mandeville, Gower, and Chaucer.

(*b*) At what different periods were large numbers of Latin words introduced into the language of the people of these islands.

(*c*) Paraphrase and analyse the following, and parse words in italics :—

(i.) When I first heard the extract I was doubtful *whether* there reached my ear *anything* which substituted a gross breach of privilege, because, *however offensive* the word '*mercenary*' *may be*, yet after all a mercenary motive *need not* necessarily *be* corrupt.

(ii.) Bird of the wilderness,
Blithesome and cumberless,
Sweet be thy matin o'er moorland and lea ;
Emblem of happiness,
Blest is thy dwelling-place.
O ! *to abide* in the desert with thee,
Wild is thy lay and loud
Far in the downy cloud ;
Love gives it energy, love gave it birth,
Where, on the dewy wing,
Where art thou *journeying*,
Thy lay in heaven, thy love is on earth.

(iii.) The sun, *awakening*, through the smoky air,
Of the dark city casts a sullen glance,
Rousing *each caitiff* to his task of *care*,
Of sinful man the sad inheritance,
Summoning revellers from the lagging dance,
Scaring the prowling robber to his den,
Gilding on battled tower the warder's *lance*,
And warning student *pale to leave* his pen,
And yield his *drowsy eyes* to the kind nurse of men.

5. (*a*) Who were the Lollards, and what were their tenets ?

(*b*) Give an account of Henry II.'s French campaigns.

(*c*) Construct a genealogical table, showing Henry IV.'s relations with the descendants of Edward III.

6. (*a*) What are the chief industries of the Netherlands ?

(*b*) Give some account of the manufactures of France.

(*c*) Describe the mountain system of the Iberian Peninsula.

(*d*) Where and what are the following :—Rheims, Landes, The Hague, La Hogue, Terschelling, Almaden, Lek, and Alicant ?

7. (*a*) *Second Year.*

(*a*) What are the commonest mistakes children make in reading ? How would you correct them ?

(*b*) What is silent reading ? Of what use is it in school work ? How would you try to get your children to read at home ?

(*b*) *Third Year.*—

(*a*) Sketch the method by which you would teach the meaning of the following terms :—Lagoon and lake, promontory and ness, plateau and plain.

(*b*) Which aspect of Geography do you think is most useful to children—Physical, Commercial, Social, or Mathematical ?

8. (*a*) Which notes of the scale bear major sixths ?

(*b*) What are chromatic notes ? Upon what principle are they named ?

(*c*) Write a passage showing transition into the first sharp remove, perfect and imperfect.

SCHOLARSHIP COURSE FOR DECEMBER, 1895.

WORK TILL THE EXAMINATION.

Reading and Copy-setting.—A few minutes' practice should be taken each day.

1. *Spelling.*—Two or three dictation tests should be taken each week. Accustom yourself to place the proper marks of punctuation.

2. *Composition.*—In the short time at disposal, little further progress can be made. The essay writing should be continued regularly each week, the Analysis of Essays which have been entered in note-books should be revised. Take care to arrange your ideas upon any subject in sections ; mark the commencement of each by commencing a new paragraph which should be inset a little.

3. *English.*—Final revision. The questions given last month are sufficient indication of the general lines upon which the Grammar is examined.

All notes on authors and their works must be finally prepared. Particular attention should be paid to the Elizabethan age.

Prepare also, if not already done, a brief epitome of the *history* of language, the chief points to notice in which are :—(1) The changes following the Norman Conquest ; (2) The formation of English from Norman French and Anglo-Saxon ; (3) The introduction of Latin and Greek at the time of the Revival of Learning ; (4) Specimens of words from the various languages from which we have taken words.

Revise also Figures of Speech, Rules of Punctuation, etc.

4. *Arithmetic.*—Make quite sure of the theory underlying all the various rules.

In the examination great care must be taken with this paper. It must be borne in mind that the solutions have not only to be correct but should also be models of clearness and arrangement. The various steps in any sum should be clearly shown and explained in words if necessary.

5. *Algebra.*—Here again make sure of the theory and proof of rules. Attend especially to Factors, Theory (Elementary) of Indices, the various theories with regard to Quadratics.

Note.—Every Quadratic Equation can be reduced to the form

$$ax^2 + bx + c = 0,$$

where a is the coefficient of x^2, b is the coefficient of x, and c is the numerical quantity.

The roots of this equation are

$$\frac{-b + \sqrt{b^2 - 4ac}}{2a} \text{ and } \frac{-b - \sqrt{b^2 - 4ac}}{2}.$$

These are obtained by the process of 'completing the square,' thus

$$ax^2 + bx + c = 0.$$

$$x^2 + \frac{b}{a}x = -\frac{c}{a}.$$

Add to each side half the coefficient of x squared $= \left(\frac{b}{2a}\right)^2$.

This is done because in any trinomial which is a square the third term must be the square of half the coefficient of the second. This is seen from an example $(x + 6)^2 = x^2 + 12x + 36$.

$$x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 = -\frac{c}{a} + \frac{b^2}{4a^2}$$

Then take the square root of each side,

$$x + \frac{b}{2a} = \pm\sqrt{-\frac{c}{a} + \frac{b^2}{4a^2}}$$

$$x = -\frac{b}{2a} \pm \sqrt{-\frac{c}{a} + \frac{b^2}{4a^2}}$$

$$= -\frac{b}{2a} \pm \sqrt{\frac{b^2 - 4ac}{4a^2}}$$

$$= -\frac{b}{2a} \pm \frac{1}{2a}\sqrt{b^2 - 4ac}$$

$$= -\frac{b \pm \sqrt{b^2 - 4ac}}{2a}.$$

This formula should be used in solving all quadratics.

The question 'Prove that the sum of the roots of the equation

$$x^2 + ax + b - 0 = -a'$$

is proved immediately from this, for the sum of the roots would be $-\frac{2b}{2a} = -\frac{b}{a}$, which is the coefficient of x in the general form of an equation, and is equal to $-a$ in the example given.

'Prove that a quadratic equation cannot have more than two roots.'

Let the equation be $ax^2 + bx + c = 0$, and suppose there are 3 roots, m, n, and p.

Substitute these values, and we get—

(1) $am^2 + bm + c = 0$.
(2) $an^2 + bn + c = 0$.
(3) $ap^2 + ap + c = 0$.

Subtract (2) from (1) and (3) from (1)—

(4) $a(m^2 - n^2) + b(m - n) = 0$.
(5) $a(m^2 - p^2) + b(m - p) = 0$.

Divide (4) by $(m - n)$ and (5) by $(m - p)$—

(6) $a(m + n) + a = 0$.
(7) $a(m + p) + b = 0$.

Subtract: $an - ap = 0$.

Divide by a: $n - p = 0$; that is, $n = p$;

Or two of the supposed roots are identical, and therefore there are not 3 roots.

6. *Euclid.*

The Definitions, Axioms, Postulates, etc., must be letter perfect. The propositions should be thoroughly revised. Practice in writing out in a limited time should be taken, and the letters A to G should not be used. The usual complaint of scholarship candidates in this paper is the short time allowed, and it is generally difficult to complete all the questions unless they can be written at a fairly good rate. It is inadvisable to stop over a deduction before the straightforward work is completed. The worry of a deduction will probably spoil all the remaining work.

7. *Geography.*

In this wide subject it is somewhat difficult to suggest in what direction special and final effort should be made. The productions, industries, and chief towns of the various colonies, the races of natives, the forms of government, the interchange of productions, are all important. The note books, if properly kept, should be of the greatest advantage now. Of one question everyone can make quite certain, viz., the Memory Map. These should be practised daily. A neat border should be ruled, the lines of latitude and longitude inserted, *with their numbers;* the coast can advantageously be shaded with a little blue lead, lightly and evenly put on; the printing should be horizontal as far as possible, and clear. This is an exercise in which neatness plays a great part. The British Possessions in South Africa should have special attention.

8. *History.*

A general revision of the whole period and of the special part should be made. Note particularly the various Statutes, Battles, Treaties, Insurrections, etc., and be quite sure you understand all the terms in connection with the Feudal System and those in general use. The following should also be noted:—(1) The decay of the Feudal System, (2) the rise of the Judicial System, (3) the origin and rise of the House of Commons, (4) the social conditions in the various reigns.

9. *School Management.*

Revise the chapters on Discipline, Teaching Aids, Object Lessons. In connection with the latter, read carefully the recent Circular of the Department.

The following is last year's paper in this subject, which may serve as a test to efficiency :—

Time allowed, 2 hours.

(All candidates *must* answer Question 1 and not more than *six* other questions.)

(1) Write full notes of a lesson on one of the following subjects :

(*a*) The Oak Tree. (For Infants.)
(*b*) The Alps.
(*c*) The Revolution of 1688.
(*d*) The Pump.

(2) By what means have you been accustomed, when teaching children to read, to promote individual effort in dealing with new or forgotten words?

(3) What are the advantages of training children to answer in sentences instead of single words?

(4) If you were given charge of a class of young children, supposed to know the simple rules, but accustomed to count on their fingers, how would you proceed to get rid of this habit?

(5) For what purposes is school drill useful?

(6) Show, by giving a short sketch in each case, the different points you would bring into prominence in giving a lesson on Alfred the Great to children in the lowest class and in the highest class of a school.

(7) What preparation have you been taught to use before letting children attempt to work sums in Weights and Measures?

(8) What part of the preparation of each lesson have you been accustomed to get the children of your class, or monitors chosen from them, to do for you? Why is it useful to get all possible work so done?

(9) What variety of occupations have you found suitable for children between five and six years old?

(10) Give the explanations you would think necessary for a class of children for whom the following passage in their reading-book was suitable :—

'These glaciers are the principal characteristics of the scenery in Spitzbergen; the bottom of every valley in every part of the island is occupied and generally completely filled by them, enabling one in some measure to realise the appearance of England during her glacial period, when Snowdon was still being slowly lifted towards the clouds, and every valley in Wales was brimful of ice.'—LORD DUFFERIN.

10. *Domestic Economy.*—Revise all carefully.

11. *Music.*—No marks should be lost on this subject. A little care is all that is needed. The following are some selected questions :—

(1) Re-write the following—(1) halving the value of each note and rest, and (2) doubling the value of each note or rest :—

(*a*)	s	:-.m	s	:d'	s	: —	—	: —	‖							
(*b*)	s	:f.m	r	:-.f	m	:r		:d	‖							
(*c*)	s	: —		:m	f	:-.t_1	d	: —	‖							
(*d*)	m	:-.f	s	: —		:r	d	: —	‖							
(*e*)	m.f	:s		: .d	f	:-.s	m	: —	‖							

(2) Describe the intervals (major third, &c.) formed by the following pairs of notes :—

f / d	t / f	m / d	l / m	d' / m	de' / m	d' / re	ta / r
se / m	f / s_1	d / se	se / t_1	ta / r	f / t_1	s / r	t / m
se / f	l / f	ma / d	t / d	ta / s	f / l_1	se / r	f / se
f / de	d' / re						

(3) If the first note of each of the following passages is regarded as t_1, what will the others become?

(*a*) fe s r l t d' fe l fe m d t_1
(*b*) m f s ta l d' ta l s ta l m f

(4) Write a descending minor scale (*lah* mode), using minor or occasional seventh, and minor or essential sixth.

(5) Give the mental effects of Fah, Lah, and Soh; Te, Me, Ray.

(6) State which notes of the common (major) scale are altered by the Lah or Minor Mode.

(7) Name the major sixth and minor seventh of the Lah or Minor Mode.

(8) Name the minor sixth and major seventh of the Lah or Minor Mode.

(9) Name the strong and leaning tones of the scale. Which tones have the greatest leaning tendency?

(10) What is the name for (1) *doh* sharp, (2) *te* flat, (3) *fah* sharp, (4) *me* flat?

(11) What is the name for (1) *ray* sharp, (2) *lah* flat, (3) *soh* sharp, (4) *me* flat?

(12) Name the following relations of the minor or *lah* mode :—(1) Dominant; (2) Minor or essential sixth; (3) Leading note or essential seventh; (4) Supertonic.

(13) Which of the following tones is highest in pitch and which lowest?—

(*a*) f in key C; (*b*) r in key G; (*c*) l in key B♭; (*d*) f_1 in key A; (*e*) t_1 in key D; (*f*) s in key F; (*g*) r' in key E♭.

(14) Work the following values in three-pulse measure. The figures show duration in pulses or fractions of a pulse. Begin on a strong pulse :—

1	¾	¼	1	1½	½	½	½	2	¼	¼	½	1½	¼	1	½	½	1	1	2	1
s	d	r	m	f	m	r	REST	l	r	m	f	s	m	d	r	m	f	t_1	d	REST

(15) Write (in figures) very distinctly over each note and rest in the following its value in pulses or fractions of a pulse :—

| m.	:f .,s	:m.f,s	| l	:-.s,f	:m.s	|										
| $f_{,}$-,s	:m	:d	‖													

(16) Re-write the following passages without a change of key :—

(*a*) m s d m_1 t_1 d m s_1 t_1 ^{d}s f l s t_1 d

(*b*) d m s d' ^{s}r f m t_1 d ^{r}s t d' m f r d

(17) Which of the following notes is highest in pitch and which lowest :—

(*a*) r in key A ; (*b*) d' in key G ; (*c*) f_1 in key B flat ; (*d*) f' in key C ; (*e*) t_1 in key A flat ; (*f*) l_1 in key D.

(18) Explain the following terms :—Dolce, Allegro, Diminuendo, Rallentando, Da Capo, Andante, Crescendo, Ritard, Staccato, M. 90, Legato, Adagio, Vivace, Syncopation, Allegretto, Largo, Pianissimo, Lento, Mezzo Piano, A tempo.

The following is last year's paper :—

1. Write (plainly) the following values in four-pulse measure. The figures show duration in pulses or fractions of a pulse. Begin on a strong pulse :—

$1\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ 1 2 1

s m f l r s f REST m r m f s m r d REST

2. Name the following intervals :—

(*a*) s—f' (*b*) m—l (*c*) f—de' (*d*) r—se

(*e*) d—re (*f*) r—ta (*g*) fe—ra (*h*) ra—de'

3. Re-write the following passages, making a change by bridge notes at (*a*), and a return to the original key at (*b*):—

(*a*) (*b*)

s d m l r s fe l d' m r fe t l d f r m d

(*a*) (*b*)

m s d m d' ta l r' s ta m s f l s t d'

4. Write the minor scale ascending, using the minor 6th and the major 7th, and again descending, using the minor 7th and the minor 6th.

5. Which of the following notes is highest in pitch, and which lowest ?—

(*a*) f' in key C ; (*b*) r in key G ; (*c*) m_1 in key B flat ; (*d*) r_1 in key A ; (*e*) s_1 in key D ; (*f*) s in key F ; (*g*) m' in key E.

6. Explain briefly the following terms :—(*a*) Legato, (*b*) Fortissimo, (*c*) Mezzo Forte, (*d*) Leggiero, (*e*) Accelerando, (*f*) Lento, (*g*) Presto, (*h*) Crescendo.

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12. *French.*—Make quite sure of the translation of 'Le Trésor.' Revise Number and Gender of Nouns and Adjectives, noting especially the irregulars. Look over the principal parts of the irregular verbs, and chief points in Grammar.

The Examination.

In concluding the course for this year's Scholarship Examination, I should like to offer a few words of advice to those who are about to compete—on points apparently trivial, perhaps, but which, taken together, may make a difference of many marks. In a competitive examination students cannot afford to lose a single mark unnecessarily, and yet scores of marks are so lost from inattention or ignorance.

1. Provide yourself with all the apparatus you will need—pens, black lead, india-rubber, round ruler, red and blue lead, compasses, etc.

2. Before commencing any paper, be careful to fill up any forms necessary, and read very carefully all instructions. *This is most important.*

3. Select the questions you intend to answer before starting. Choose those questions you are *sure* of.

4. Divide up the available time amongst the questions, and adhere rigidly to the time. There is always a great temptation to take too much time over questions which are well known, to the detriment of others. Allow a minute or two to think over the answer, and two or three minutes for revision.

5. Keep all your work as clean and neat as possible. Nothing annoys an inspector so much as careless, untidy work.

6. Work your hardest, and pay no attention to any other candidate.

7. Where an answer admits of it, tabulate. It saves time.

8. In Arithmetic pay particular attention to *method* and arrangement. Set answers clearly out on the right.

9. In Euclid draw large, clear figures.

10. Make all answers as concise and lucid as possible. Don't try to deceive an inspector by writing round a question.

11. Don't discuss 'answers' afterwards with others. It is generally unnerving.

12. Don't work up to the last minute. A day or two's rest will allow the brain to become refreshed.

13. Take with you a record of dates, places, etc., of all certificates gained which count for Scholarship ; you may need them.

I sincerely wish my readers every success, and shall be glad to hear of their success.

Next month we shall start work for 1896 ; a list of suitable text books will be given, and some advice upon methods of study.

CORRESPONDENCE.

1. Individual assistance will be given as far as possible by advice, solution of difficulties in any subjects, model answers, etc.
2. Specimens of Writing, Paraphrasing, Maps, Composition, etc., will be marked and criticised gratis.
3. To assist students in rural districts, Freehand or Model Drawings will be corrected and marked, with hints for improvement, etc., and returned if accompanied by a postage stamp.
4. As a rule, all replies will appear in the Correspondence Column, but anyone desiring an immediate reply may obtain it by enclosing a stamped, addressed envelope.
5. To ensure an answer in the next issue queries must be sent by the 15th of each month.
6. Name and address of sender, with coupon of current number of the PRACTICAL TEACHER, and *nom de plume* if desired, must be enclosed.

All communications and queries with regard to these courses to be addressed to Arthur T. Flux, 12, Lower Park Road, Belvedere, Kent.

ANSWERS TO CORRESPONDENTS.

DESPAIR.—Coast line should be drawn by a bold *ink* line. Rivers should be in ink. Keep your printing horizontal as far as possible.

GIPSY JANE.—70 per cent. The slope is a little too great, and in the small-hand there is a tendency to angularity, which should be checked.

DESPAIR.—40 per cent. You have neglected advice given many times—'Practise from a good model.' The letters are incomplete and irregular.

J.C.B.—Writing, 80 per cent. ; essay, 90 per cent.

W.G. (Yalding).—Your solutions are correct. 3 *b* appears to be a careless error ; 4 *a* is a manifest oversight in the last figure.

KERME.—Essay 40 per cent. Your subject matter is much too simple ; the idea has not been properly thought out. There is a backward slope in your writing which spoils it, and it is too round. Marks 50 per cent.

ANSWERED BY POST.—Miss H. (Worthing) ; A.N. (Aberystwith) ; E.A.B. (Beverley) ; E.M.A. (Lakefield) ; M.H.J. (Bunmoor) ; M.G. (Congleton) ; E.H. (Horrabridge) ; G.B.(Orkney) ; R.A. (West Bromwich) ; J.M.C. (Worcester) ; J.K.C. (Douglas) ; G.L.W. (Fulfield) ; H.B. (Sheffield) ; M.J.W. (Whitehaven) ; E.J.S. (Bridgewater) ; L.T.B. (Madeley) ; Miss W. (Gorton) ; J.C.G. (Horsforth) ; J.H. (Wellington), &c.

ELEMENTARY PRACTICAL CHEMISTRY.

THE NEW SYLLABUS, AND HOW TO MEET IT.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),

First Class Honoursman in Practical Chemistry, Lecturer in Chemistry to the Middlesex County Council, Author of Conversational Lessons in Chemistry.

TEACHERS of chemistry, and especially they who have to do with the younger section of the students, are greatly exercised in mind as to how they may meet the new requirements in practical chemistry, elementary stage. To do this in the future will necessitate a much greater expenditure of time, labour, and money than has been needful in the past. It is all very well for the Department to make light of balance work ; teachers know how long a period must elapse before an ordinary boy or girl can be relied upon to weigh with sufficient exactness for a result to turn out respectably. In this part of the work a start should be made from the very first lesson, and as much time as possible should be spent at the balance.

Below is given the Department's account of the four tests which may be applied to elementary students :—

The practical examination may consist of exercises selected from any of the following divisions of experimental work :—

A.—Testing of two powders, neither of which will contain more than two metallic and one acid radicle from the above list (Pb, Cu, Fe, Zn, Ca, K, NH_4, chlorides, sulphates, nitrates, carbonates). The powders will be soluble in water or in dilute acid.

The experiments made must be carefully described, and the analytical results clearly stated and confirmed by more than one reaction.

No notes, books, or analytical tables may be consulted during the examination.

B.—Carrying out experiments for which printed instructions will be given in the paper, *e.g.*, the observation of the effects of *heat*, or of *water*, or *acids*, etc., upon the materials supplied. If a gas is evolved, the candidate may be required to determine what it is. [Such a gas will always be one of those referred to under Subject X, First Stage, and of which the properties have been demonstrated in the lectures.]

C.—Recognition of materials which have been exhibited upon the lecture table, and the properties of which have been demonstrated, *e.g.*, sulphur, iodine, charcoal, manganese dioxide, potassium chlorate, nitre, sal-ammoniac, etc.

D.—Quantitative experiments of a simple kind, *e.g.*, (1) *a metal or a salt may be supplied to be weighed, dissolved in acid, and the amount of evolved gas measured at the temperature of the laboratory.* (2) Or *the carbon dioxide in a carbonate may be estimated by solution in an acid, and observation of the loss of weight.* (3) Or *determination of the weight of one metal, such as silver, which can be displaced by another, such as magnesium.* (4) Or *experiments on the neutralisation of acids or alkalis.*

Very little difficulty will be found in dealing with *B* in a rough and ready way, but the student must beware lest a pitfall be set for the unwary in the shape of this simple exercise. The intention of the Department, or rather of Professor Tilden, who is, we are assured, mainly responsible for the new syllabus, is to test the observing powers of the student, especially as respects inconspicuous phenomena. Supposing the question be the effect of heat upon HgO, it would not satisfy the Department to mention the evolution of O and the formation of the mirror of mercury on the sides of the tube; the blackening of the oxide when hot as well as the presence of fumes (due to impurities) would have to be mentioned, even if not explained, the chief aim being to ensure that no part of the actual phenomena shall escape notice.

Action of water on material supplied.—Lime, caustic potash, and caustic soda, H_2SO_4, etc., possibly such mixtures as soda carbonate and tartaric acid, as well as substances which crystallise readily from saturated solutions, such as KNO_3, $CuSO_4$, $5H_2O$, Na_2SO_4, and toH_2O, are the bodies to be expected here.

Action of heat.—Not only may we expect instances of decomposition as in the case of $KClO_3$ and NH_4NO_3, where, as before noted, all the phenomena must be observed and described, but also bodies may be given to be dissolved in water and then heated, the aim being to bring out the variation (increase as in $CuSO_4$, KNO_3, and most other bodies, or decrease as in the case of $CaSO_4$) in solvent power; red and blue litmus as well as lime water on a rod or in a tube should always be applied in the case of evolved fumes, and some of the fumes should be led into water in order to show solubility or insolubility.

Action of acids.—This would perhaps be the easiest exercise of all, such bodies as H, HCl, Cl, H_2S, CO_2, NO, etc., being the gases likely to be met with under this exercise.

C.—It must not be supposed that mere unexplained recognition will be anything like enough under this head. Without doubt the student will be expected to state minutely the evidence upon which he bases his belief and assertion. To say, for example, that a certain black powder is manganese dioxide, would probably cost the teacher (unlucky wight) half a crown did not the student back up his assertion by adding HCl to the substance, and so getting chlorine, which should be tested by starched paper dipped in KI. The well-known threefold division of the examination paper into EXPERIMENT—OBSERVATION—INFERENCE would be just as necessary, nay, even more necessary here than in the case of analytic work. If it be remembered what a hard taskmaster the Science and Art Department is, no argument will be wanted to make the teacher believe that this apparently simple exercise will be made abundantly 'pitfally' by the ingenious gentlemen who prepare the tests, and it is the charge of incomplete observation or of lack of confirmatory tests that will be the ground for rejection. The wise teachers will therefore spend much time in this 'simple' work.

D divides itself into four subdivisions :—

(*a*) *Placing a weighed portion of a metal or a salt into acid and measuring the evolved gas*, zinc, iron, magnesium in HCl or H_2SO_4, Cu or Hg in H_2SO_4, and Cu, Pb, Hg in HNO_3, would be the chief exercises so far as metals are in question, with marble in H_2SO_4 and HCl as the commonest exercise in non-metallic material. It may be hoped in this connection that the evolved gases will be insoluble in water and easily prepared. It must not be forgotten, however, that the absorption of CO_2 by caustic alkalis and the solubility of SO_2 in water may be taken as means of determining the amounts given off.

(*b*) *Estimation of CO_2 by loss of weight.*—Under this head nothing need be said except that some simple apparatus should be chosen and that it should be frequently used to ensure facility in manipulation, as a great degree of accuracy is likely to be expected here. It must not, however, be forgotten to include those cases where the CO_2 may be easily driven off by heat, such as in the case of magnesium and zinc carbonates, since the determination of these bodies in the two ways indicated, viz., by heat and by acids, will be a very instructive means of correcting results.

(*c*) *Determination of the weight of one metal, such as silver, which can be displaced by another, such as magnesium.*—Exercises in order to determine Reciprocal Proportions or Equivalents may be multiplied indefinitely. The following will be the more useful examples :—

1. Zinc in copper sulphate.
2. Magnesium in copper sulphate.
3. Copper in silver nitrate.

Again, the equivalents of magnesium, zinc, aluminium, and iron, may be determined by ascertaining the weight of each required to displace an equal volume of hydrogen. There are many neat ways of doing this. One way is to prepare a tube open at each end, the lower end being plugged with glass, wool, or with copper gauze, the upper end being under a beehive shelf in the usual pneumatic trough. The tube is carefully lowered into a beaker of dilute HCl, whereupon a slow current of H collects in the jar, the volume of which when the evolution ceases can be measured by putting an india-rubber ring round the jar at the level of the water and then filling up with water from a burette.

Or the weighed portion of the metal to be tested may be placed in a tube, which is placed in a burette filled with dilute HCl, which acts upon the metal, the evolved H being collected in the burette.

Concerning acidimetry and alkalimetry, recourse should be had to works on quantitative analysis.

Many very useful hints as to neat, reliable, yet withal simple methods, may be obtained from a careful perusal of Professor Reynolds' 'Experimental Chemistry for Beginners,' from Professor Tilden's 'Hints on the Teaching of Elementary Chemistry,' and from Newth's 'Chemical Experiments,' all of which are published by Messrs. Longmans. Whatever experiments and whatever apparatus the lecturer employs, it must be his steady aim to ensure (1) intelligent and acute observation—a by no means easy task; (2) ability to manipulate and to use the balance; (3) readiness in grasping the purport of written directions for the preparation of bodies. Below will be found two sets of examinations in groups A, B, C, D, on what we conceive to be Departmental lines.

TWO EXAMINATIONS IN PRACTICAL ELEMENTARY CHEMISTRY.

First Examination.

A.—First mixture, CuO and $ZnCO_3$.
Second mixture, $Pb(NO_3)_2$ and NH_4NO_3.

B.—Take a portion of the substance supplied, place it in water, and correctly describe what takes place. When the substance has settled to the bottom of the vessel, decant off some of the clear liquid, and apply it to some simple tests, in order to discover what change has taken place in the water. Now take another portion of the solid, and add to it, in a test-tube, a very dilute solution of HCl. Pour off the supernatant liquid, and again test, with the view of exactly describing what has taken place. (Substance is CaO.)

C.—Identify the four specimens provided, and state clearly and fully upon what grounds your identification rests. (Substances are nitre, ammonium nitrate, sal-ammoniac, and sodium sulphite.)

D.—Weigh out one gramme, or thereabouts, of the silver nitrate provided, and determine (*a*) what weight of silver is given by your substance after heating in a hard glass tube, and (*b*) determine the percentage of silver in silver nitrate from these figures.

Second Examination.

A.—First bottle, $CuSO_4.5H_2O$ and $FeSO_4.7H_2O$.
Second bottle, NH_4NO_3.

B.—Describe the action of sulphuric acid upon the two substances provided. Identify the gases or fumes given off, and collect in appropriate apparatus a portion of each body evolved in consequence of the action of H_2SO_4 aided, if necessary, by heat.

C.—Identify the following four specimens, clearly stating upon what grounds your opinion as to their identity rests. (Mercuric oxide, flowers of sulphur, chlorate of potash, and plumbago.)

D.—Dissolve about half a gramme of the substance given in water. Place a standardised solution of HCl in the burette, and carefully ascertain what weight of HCl is required to exactly neutralise the substance (Na_2CO_3).

ROYAL COMMISSION ON SECONDARY EDUCATION.

REPORT OF THE COMMISSIONERS.

BY THOMAS CARTWRIGHT.

On March 2nd, 1894, Her Majesty commanded the appointment of a Royal Commission 'to consider what are the best methods of establishing a well-organized system of secondary Education in England, taking into account existing deficiencies, and having regard to such local sources of revenue from endowment or otherwise as are available, or may be made available, for this purpose, and to make recommendations accordingly.'

The composition of the Commission was admirable, as will be seen from the following list of the seventeen Commissioners:—Right Hon. J. Bryce, M.P., Chancellor of the Duchy of Lancaster, Chairman; Right Hon. Sir J. T. Hibbert, M.P., K.C.B., Financial Secretary to the Treasury; Mr. Henry Hobhouse, M.P., Chairman of the Somersetshire Technical Education Committee; Mr. H. Llewellyn Smith, Member of the Technical Education Committee of the London County Council; Dr. R. C. Jebb, M.P., Professor of Greek in the University of Cambridge; Mrs. Henry Sidgwick, Principal of Newnham College, Cambridge; Mr. M. E. Sadler, Secretary to the Oxford University Extension Delegacy; Rev. A. M. Fairbairn, D.D., Principal of Mansfield College, Oxford; Hon. and Rev. E. Lyttelton, Headmaster of Haileybury College, Chairman of Council of the Teachers' Guild; Mrs. Bryant, D.Sc., a Mistress of the North London Collegiate School for Girls; Dr. Wormell, D.Sc., Headmaster of the London Central Foundation Schools, Deputy-Chairman of Council of the College of Preceptors; Very Rev. E. L. Maclure, D.D., Dean of Manchester, Chairman of the Manchester School Board; Mr. George J. Cockburn, Chairman of the Leeds School Board; Mr. J. H. Yoxall, Secretary of the National Union of Elementary Teachers; Sir Henry Roscoe, M.P., F.R.S.; Lady Frederick Cavendish; and Mr. C. Fenwick, M.P.

The Commission set to work with the praiseworthy determination of 'getting through" in the minimum of time, and if they have not broken the record for speed, they have not fallen short of this happy achievement. About 80 witnesses were exhaustively examined, yet the Report was handed in on Aug. 17th of the present year, and was finally given to the world at large on Nov. 1st.

Nine bulky volumes will be added to the already vast accumulation of Blue Book literature as a result of the patriotic labours of the seventeen Commissioners. Will this crop of Blue Books represent the sole fruit of the meritorious labours, or will Matthew Arnold's life-long aspiration at length be realised in the creation of a worthy system of education for the predominant partner in English citizenship—the middle class? Who shall say? The wheel of Parliament grinds slowly, and frequently not at all, and Commissions come and Commissions go, but abuses go on for ever. It is, however, worthy of most careful note, that Sir John Gorst, at Queen's Hall, Langham Place, most emphatically endorsed the chief recommendations of the Commission, and specifically included them in his programme of things to be done.

With the eight last volumes of this series we shall, at present, have no concern. Volume One—divided into four parts, as follows: Part I., Historical Sketch; Part II., The Present Condition of Secondary Education in England; Part III., Review of Evidence, with Discussion of Suggestions made by Certain Witnesses; and, above all, Part IV., Recommendations—will more than exhaust our space, if not our readers' patience.

Part I.—Historical Sketch.

Reference is made to the Royal Commissions of 1861 and 1864, and to the Public Schools Act of 1868, and a moan is allowed to escape concerning the 'less happy fate of a good part of the recommendations of these Commissions which has been relegated to the limbo of forgetfulness, without any degree of fructification. Higher Grade Board Schools, Science Schools and Classes, University Colleges, University Extension, the Technical Instruction Act, and the Welsh Intermediate Education Act, all are referred to in turn as forces which have and are influencing the spread of systematic Secondary Education. In remarking upon the change in the status of the teacher, the N.U.T. is referred to as 'The most numerous (body), counting at present about 28,000 members, nearly all engaged in elementary schools, and not wholly unconcerned with Secondary Education, because many so-called elementary schools have virtually become secondary.'

The two points which need be emphasised respecting this Part I. are (1) this and other remarks which distinctly place Higher Grade Schools in the category of secondary schools, and (2) the contention that the Fees Grant has rendered unnecessary many endowments now enjoyed by elementary schools upon which, as will be seen later on, the secondary school authorities are invited to pounce.

Part II.

Herein are set out in detail the functions and jurisdiction of the central authorities connected with secondary instruction. These are (1) The Charity Commissioners, (2) The Department of Science and Art, (3) The Education Department, and (4), The Board of Agriculture. Under (3) occurs the following pregnant statement:—'Not only is a large amount of secondary instruction given by teachers in elementary schools, but the passing of the teacher from elementary schools to secondary is no longer a rare occurrence.' Under local authorities are given (1) County Councils, (2) The London Technical Education Board, (3) Borough County Councils; whilst governing bodies of endowed schools or of proprietary schools, local committees under the Science and Art Department, School Boards and managers of Voluntary Schools are unceremoniously lumped together under the vague heading of Other Educational Authorities.

Finance is next dealt with under the heads of:—

(*a*) Endowments subject to the Endowed School Acts, the net available amount for education being estimated at £650,000 per annum.
(*b*) Endowments applied or applicable to elementary education, of which the Commission recommend the appropriation; total £100,000.
(*c*) Other endowments of an unknown total.
(*d*) Grants from the Science and Art Department, £171,069.
(*e*) Grants from the Board of Agriculture, £8,000.
(*f*) Funds available under the Local Taxation (Excise and Customs) Acts—otherwise known as the whisky money—£531,000 at present—should be £744,000.
(*g*) The rate (1d. in the £ being the maximum) leviable under the Technical Instruction Acts; possible total, £640,000.
(*h*) Grant under Elementary Education Acts unknown.
(*i*) School Board rates.
(*k*) Grants for Evening Continuation Schools, £91,540.

It will be thus seen that the Commission's ideas as to how and whence the sinews of war are to be obtained bear a striking resemblance to Sam Weller's knowledge of London, insomuch as they are undoubtedly both varied and peculiar.

Next in order are given the several classes of secondary schools, as thus:—

First Grade Schools.

1. First grade endowed schools, including the seven great public schools.
2. First grade proprietary schools sending pupils to the Universities or University colleges.
3. Private schools of the more advanced type.

Second Grade Schools.

1. Second grade endowed schools.
2. Proprietary or private schools which send in pupils for the higher classes of the College of Preceptors' examinations, or for the Oxford and Cambridge local examinations.
3. Some day schools at technical institutes.
4. The highest departments of some higher grade elementary schools.

Third Grade Schools.

1. Third grade endowed schools.
2. Private schools in which the ordinary standard is that of the third-class certificates in the College of Perceptors' examinations.
3. Higher grade elementary schools.

A description of the highest interest is given of each class of school.

A note on the 'geographical distribution of the 60 higher grade board schools outside London' will interest many. 'In 23 out of the 40 counties there are no such schools. No less than 35 of the schools are in the three counties of Durham, Lancaster, and York; eight midland and eastern counties contain 19, and the rest of England (outside London) has but 6. Of the 60 schools, 48 are in county boroughs, and 12 in smaller towns.

The bodies which conduct examination or inspection, which is the topic next enlarged upon, will be sufficiently familiar to teachers to need no further reference.

Under the head of '*Defects in the Supply of Schools*' are to be found some interesting statements. Rural teachers will read with interest that 'The higher grade board schools are doing much to supply third grade secondary education; but there are still many

places where it is wanting. *In rural* districts it is this grade of education which is primarily needed. In towns, and especially in the smaller towns, there is still a widespread need for second grade schools.'

And, again, 'One resource which has been tried is *an elementary school with a secondary top*; but this does not always succeed.' Probably, however, such failure can be explained, and the plan may yet be found workable in some places.

Coming to the 'Deficiency of means for transferring pupils from one grade of education to another,' we hap upon one of the most important of modern day problems. That 'there is need for a larger provision of means for transferring pupils from the elementary to the higher school' has long been conceded. But how? Liberal provision of scholarships is the Commission's panacea, concerning which we shall have a word to say anon. Meanwhile let us hasten to add that the treatment of this question of scholarship shows a marked improvement upon preceding methods, as witnesseth the following:—'A larger supply of scholarships, on reasonably elastic conditions, is certainly most desirable, in order that the higher grade elementary school may be firmly established as an important part of the provision for third grade secondary education, feeding at once the technical or scientific school, and the more literary school in the rank next above its own.'

Touching 'Defects of Organisation' we have treatment under three several heads: (1) the powers of authorities and their relations to each other; (2) the relations between schools; (3) questions connected with the internal organisation of schools. Of these, the remarks under (3) will be most worthy of the consideration of the primary teacher, whose superiority in teaching ability is fully acknowledged. 'It is only since elementary schools have begun to do some secondary work, and primary teachers have begun to find their way into secondary schools, that English observers have been enabled to compare trained and untrained teachers of the same subjects. The master in an elementary school may sometimes be too mechanical; he may sometimes be lacking in general cultivation and in appreciation of literature, and therefore in fitness to teach it; his efficiency as a teacher may also be limited in some cases by the narrow groove within which his knowledge of his subjects is confined; but in regard to the right ways of teaching, and the principle on which those methods rest, he is a disciplined expert, often imbued, too, with a genuine enthusiasm for the art which he has laboriously acquired. . . One of the differences which may be usually observed is the superiority of the trained teacher in maintaining the attention of a large class.'

Advocates of mixed schools will be glad to know that the Commission is distinctly convinced of the efficiency of such establishments, and recommends their adoption in sparsely populated areas as a solution of the question how to provide efficient secondary instruction. This interesting Part II. concludes with a lucid summary which we would fain quote, did not considerations of space inexorably forbid.

Part III.

Review of Evidence, with Discussion of Suggestions made by certain witnesses. This we must pass over, as the suggestions which have carried general conviction will be recognised in the recommendations of which they were the primary cause.

Part IV.—Recommendations.

The aim of the Commissioners as set forth in their recommendations has been aptly described as 'the maximum of simplicity with the minimum of change.' The document, as it stands, is a transparent compromise, calculated consequently to fully please nobody, at the same time that it gives everybody—even the primary teacher—some reason for just congratulation.

In the words of the report, the measures which seem wise to the Commission fall into five classes:—

I.—Those which relate to the constitution and powers of a central authority calculated to bring the State into a fitting relation to Secondary Education.

II.—Those which relate to the constitution and powers of Local Authorities, rural and urban.

III.—Arrangements for the better organisation of schools, including—

- (*a*) The kinds of schools needed, and their classification and co-ordination.
- (*b*) Special provisions for rural districts.
- (*c*) Local governing bodies of schools.
- (*d*) Scholarships and exhibitions.
- (*e*) Examination and inspection.

IV.—Financial arrangements.

V.—Questions specially affecting teachers, including the registration of teachers, and their professional education.

The Central Authority.

Under this head we have that *rara avis* an all-round popular suggestion, viz., that there should be a Minister of Education who will be the presiding genius of all grades of education. He is, moreover, to have as a consultative aid an educational council of experts to consist of twelve members chosen as follows:—

- (*a*) Four appointed by the Crown.
- (*b*) Four (one each) by the universities of Oxford, Cambridge, London, and Victoria.
- (*c*) Four other members to be co-opted by the preceding eight.

This central authority is to absorb the Science and Art Department and the Charity Commissioners, thus dealing a blow at the distraction-begetting multiplicity of overlords under which education and the primary teacher have so long groaned and travailed.

It will be noted that there is apparently no provision for ensuring the presence of teachers *qua* teachers on this council. On this head the following section will be instructive:—

'We were at one time disposed to recommend also the election of some members of the council by the teaching profession as a whole, a scheme supported by not a few witnesses; but the practical difficulties in the way of arranging for such an election, by a vast number of persons scattered over the country and divided into several sections with interests not altogether the same, appear to us to be at present insuperable; and we therefore think it better to attempt to ensure by the method of co-optation the presence of a professional element.

'It will, nevertheless, deserve to be considered, after the register hereinafter recommended has been formed, whether regulations may not usefully be framed, under which those who are to constitute this professional element may be chosen on the recommendation of the teaching profession itself instead of at the discretion of the co-opting members of the council.' Thus, 'it will all come right in the end,' and it is something to contemplate with certainty the time when the free-lance business of the Science and Art Department will be usefully checked by the censorship of the Minister of Education, aided by his advisatory council of experts. Perhaps we shall then at length no longer be edified, amused, or incensed by philippics against the heinous crime of turning the drawing paper about in the lower standards.

The functions of this central authority as shadowed out in the Report, are (1) to aid in the establishment of the local authorities; (2) to see that such authorities perform their duty, especially in the provision of sufficient secondary schools; (3) to approve or reject 'schemes' for the carrying on of schools, and the exercise of the functions now possessed by the Charity Commissioners; (4) to exercise jurisdiction over 'non-local' schools; (5) settlement of disputes between local authorities; (6) arrangement of expansion or union of local areas; (7) sanction of the acquisition of private schools; (8) appointment of officers and inspectors.

To this authority appeal from the decisions of the local authorities may be made.

To the Educational Council alone is committed the function of settling what schools are to be regarded as 'non-local,' and also the control and censorship of the register of teachers.

With brutal frankness it is clearly laid down that this educational authority is not to follow on the lines of the Education Department; and the 'code' comes in for a thinly-veiled expression of disapproval, if not disgust. 'Such a code of regulations and such a system of examination and inspection as the Education Department has applied to elementary schools would, in our view, be not only unfitted but positively harmful to secondary education.' (And if to secondary, why not to primary?)

Local authorities whose duty it will be to manage and control schools, subject to the approval of the central authority, are next dealt with, and it is in this connection that we note the slap in the face for the School Boards, for the controlling voice in these most important bodies is to be given, not to the School Board, but to the majority appointed by the County Council. In the counties we have the following suggested constitution in respect to a local authority of 28 members:—

Chosen by the County Councils - - - -	16
,, ,, Central Office - - - - -	4
Co-opted by the above - - - - -	8

It will thus be seen that in the counties it is quite possible for the School Boards to have not a single representative.

In the County Boroughs matters are of a little better complexion, the composition of the authority being as follows:—

Chosen by the Borough Council - - - -	$\frac{1}{2}$
,, ,, School Board - - - -	$\frac{3}{8}$
,, ,, Central Office - - - -	$\frac{1}{8}$
Co-opted by the rest - - - - - -	$\frac{1}{8}$

The sad case of the London School Board will be evident from the account of the constitution of the London authority given below :—

Appointed by the	County Council	18
,, ,,	School Board	7
,, ,,	City and Guilds Institute	2
,, ,,	City Parochial Charities Trustees	2
,, ,,	Oxford and Cambridge Universities	2
,, ,,	University of London	2
Co-opted by the other members		9
		42

If the result of this passing over of the School Boards were simply a reminder to these bodies that pettiness in dealing with teachers and niggardliness in dealing with scholars and schools are not the best ways of securing the confidence and esteem of the public, one would be inclined to say 'well done.' But the matter strikes deeper than this, and is, therefore, most devoutly to be regretted, and most uncompromisingly to be opposed. In order to prevent the perpetuation of 'mute inglorious Miltons,' the passage from the primary to the secondary and technical school must be of the easiest, so that there may be no possibility of leakage of talent. This can only be the case where primary, secondary, and technical schools are under the direction of one and the same Local Authority. We feel sure that any failure to remedy this disunion and possible antagonism of governing bodies cannot but result in disaster. We, therefore, most earnestly trust that legislation will not sanction this virtual ignoring of the School Boards, but that the aim will be to enlarge their areas and improve their *personnel*, and to commit to their charge the fostering care of all phases of education. We admit that many, perhaps most, of the School Boards do not, as at present constituted, inspire much confidence. This can be remedied by making the School Board areas co-extensive with those of the county and borough councils, or in some other way. If this be left undone, the opposition to the passage of a bill embodying these recommendations will inevitably wreck the whole scheme.

Personally, the elementary teacher is bound to oppose this duality of local authorities. Promotion to secondary schools, except as subordinate teachers, is a practical impossibility. Only those who have tried to cross the borderland between primary and secondary schools can appreciate the sniff of contempt with which the application of an elementary teacher is received. We have in our minds at the present time two men—one a poorly-qualified master of a proprietary secondary school, who with difficulty had become an inter-B.A. of London University ; the other was a B.A. with treble honours, who had done admirable service in primary and pupil-teacher schools. Both had endeavoured to obtain the head-mastership of small grammar schools. One has been taken, and the other left ; and the poorly-qualified inter-B.A. from the proprietary school is now the head-master of a secondary school, whilst the smart Honoursman has, after repeated rebuffs, recognised that there is no passage into a grammar or endowed secondary school for the master, however qualified, who has the elementary taint. Given one local authority, it might well be hoped that this disgraceful caste ostracism would die out, as it never will under a dual system of authorities. For the rest, the recommendations under this head are sagacious. There is to be an outside chairman when desired ; women are eligible for membership—nay, it is suggested that provision should be made that 'a certain number shall be women' ; and variations in constitution are, within certain limits, to be permitted.

Duties and Functions of Local Authorities.

These are classified under the four following heads :—

1. The securing of a due provision of secondary instruction.
2. The re-modelling, where necessary, and supervision of the working of endowed (other than non-local) schools and other educational endowments.
3. A watchful survey of the field of secondary education, with the object of bringing proprietary and private schools into the general educational system, and of endeavouring to encourage and facilitate, so far as this can be done by stimulus, by persuasion, by the offer of privileges and advice, any improvements they may be inclined to introduce.
4. The administration of such sums, either arising from rates levied within its area, or paid over from the National Exchequer, as may be at its disposal for the promotion of education.

Under supervision it is recommended that *all schools*, whether on the list of recognised schools or no, shall be thoroughly tested as to their sanitary condition. This is, however, all the supervision to which 'non-listed' schools will be subjected. Recognised schools will, in addition, be inspected by men chosen by the local authority, for whose assistance a list of competent inspectors will be compiled. In connection with the work of inspection occurs one of those portentous passages which show how far we have advanced in our revulsion from the tape-measure system of guaging progress. 'The inspection we contemplate is something quite different from the work hitherto done by Your Majesty's Inspectors in the elementary schools. All that seems necessary for the local authority to secure is a report from a competent hand upon the general condition and equipment of each school, including particularly the number and qualifications of the teaching staff. There ought also to be a power to require that each school, or a certain portion of the scholars, should be annually examined by some independent and competent person.' Later on, this question of inspection is entered into with greater detail, and here again is to be found many a hard rap for those who have been responsible for the appointment of Her Majesty's Inspectors of primary schools.

'In selecting persons for these posts, great weight ought to be given to previous experience in teaching. Duly qualified women should be chosen where there is likely to be sufficient work for them.

'The appointment of such inspectors should, we think, be made independent of any limit of age. This rule, which is contrary to the present practice of the Education Department, would often enable the local authority to secure a man of greater educational experience than can be done under the present system.'

The classes of schools as above intimated to be recognised are three, viz., 1st Grade, leaving age, 18 ; 2nd Grade, leaving age, 16 ; 3rd Grade, leaving age, 14. In populous areas, district schools of each grade should exist, but in sparsely-peopled districts a compromise would be effected whereby a second-grade school should have a first-grade 'top,' or a third-grade school a second-grade 'top.' In such districts, also, it is recommended that mixed schools be organised, it being recognised that such schools have done and are doing excellent work. Higher Grade schools are recognised as being of the 'third grade,' and, as aforesaid, it is intended that each school should be taken over by the Secondary Education Local Authority, the School Board being merely recognised as managers of the appropriated school. To make secondary instruction of the third grade available, even in rural areas, the organisation of elementary schools with a third-grade top is recommended, so that we may expect, should the recommendations become law, the assimilation of the Higher Grade urban school and the creation of Higher Grade schools in rural districts, satisfactory arrangements being made with the elementary school managers in order to effect this purpose.

Organised Science Schools as well as Evening Continuation Schools are in like manner to be brought into the 'secondary' fold.

Proprietary schools are to be recognised if (1) sanitary condition, (2) apparatus, (3) teaching staff, (4) curriculum, (5) fees, be such as commend themselves to the local authority. Furthermore, as a condition to continued recognition, such school must (1) be open to inspection, (2) submit to an annual examination of all or part of the scholars, and (3) submit an annual statement of salaries paid to teachers, (4) head-master and certain proportion of assistants must be on the register. In return, the proprietary school would enjoy the benefit of room and inspection provided by the authorities, and its pupils could compete for the scholarships provided, and the school could receive such scholarship holders as may be eligible to attend a school of its grade.

Scholarships.

No part of the Report is more interesting than that referring to the granting of scholarships, and the recommendations are instinct with the desire to secure perfection with respect to the granting of aid to necessitous children likely to benefit from enlarged opportunities in the matter of education. It is suggested that 'scholarships tenable at a secondary school should be of one or more of the four following heads :—

'(i.) Some should be open to children being educated in the ordinary standards of public elementary schools within the local area.

'(ii.) Others should be awarded to children who are receiving their education at a (so-called) higher grade elementary school, or a secondary school (whether public or private) of a less advanced type than the school at which the scholarships are to be tenable.

'(iii.) Others, again, might be open to all children attending any schools within the area of the local authority, or whose parents reside or are employed within the area.

'(iv.) In some localities it may also be advisable to have scholarships open to all children free from any restrictions as to school or residence, but subject to suitable conditions as to age and the means of the parents.'

In the case of elementary schools it is provided that there shall be, as a rule, no competitive examination below the age of twelve, worthy scholars being chosen by the head-master and the managers from a consideration of his previous attainments. Scholarships are, in certain cases, to be attached to certain schools, and in all cases of competitive examinations, *viva-voce* work is to be an important element.

As to value, cost of maintenance is to be included, as well as school expenses, and an attempt is to be made to minimise, if not altogether scotch, the unfair competition of the rich, who have resorted to the practice of having their children especially coached for valuable scholarship examinations. No longer are these wealthy parents to be tempted, since the value of the scholarship is to be considerably reduced; but in the case of a really necessitous scholarship winner, there is to be an added value to cover proved needs. In order to appreciate the full extent of this reform, it is only necessary to read the evidence of sharp practice on the part of undeserving parents.

Financial arrangements,

to which we have already referred, are next reported upon. The only really important points needing reiteration are (1) the abstention from any fresh demand on the Treasury, and (2) the expressed desire that in appropriating the income from the 'Customs and Excise Act,' no unnecessary interference with existing work is to be permitted, the value of these labours being expressly put on record. 'We feel strongly the importance of securing that facilities for the continuance of education which are now offered by evening institutions and classes (conducted under the Technical Instruction Acts) to persons occupied during the daytime should in no way be curtailed, owing to any zeal, however laudable, in developing other branches of secondary education.'

Education at Cost Price.

This is the principle upon which secondary instruction is to be given to all, except scholarship holders.

The following quotation shows that there is little sympathy with the provision of free secondary education :—'The tendency which has of late years appeared in places where well-to-do parents send their children to higher grade elementary, or even to ordinary elementary schools, to supply secondary education to all comers at much less than it costs to secure good secondary teachers, and the habit which has grown up in places possessing large endowments, and charging low fees, even to persons able to pay good ones, may make it difficult to recur to this principle in those places.' The wisdom or unwisdom of this recommendation will depend upon the number of scholarships, and upon the odour in which scholarship holders are held. If they are looked upon as in any way inferior to the fee-payers, all-round free secondary education would be preferable, let the cost be as great as it may.

The Pecuniary Position of Evening Schools.

Grants 'made by the Education Department to evening schools and continuation schools ought, in our opinion, to be consolidated into a grant to be made to the new local authorities for secondary education, such grant being on a scale not lower than the existing grants, but regulated by new conditions, and applicable to secondary education in all its forms and branches,' which does not look like maintaining these institutions, which have been the subject of so much care and attention during the last few years. Rules are to be drawn up by the Central Office for the guidance of those who receive this grant, and watchful care is to be kept that the money is wisely spent. The report generously leaves to the 'National Government, from whose coffers these sums will be derived, to fix the principles and formulate the rules under which the money will be applied to education.' Altogether the possibility that useful evening work may be materially hindered, should the report become law, is by no means a remote one.

The Register.

An unmixed good is the universal verdict upon this item of the recommendations, which is a distinct triumph for the N.U.T., seeing that *all* teachers, and not merely those engaged in secondary schools, may be registered upon notifying the Council of Experts, under whose control the register will be. The conditions of membership laid down by the Commissioners are two :—

(1) The possession of a university degree, or its equivalent.

(2) A certificate or diploma of adequate knowledge of the theory and practice of education granted by a university, or a body recognised as equivalent by the Council.

Teachers who have been engaged in secondary schools for three years at the date of the report go on the register as a matter of course, and there are special powers vested in the Council of registering 'teachers of great and acknowledged ability' who do not satisfy the afore-mentioned requirements. It is recommended that the register be alphabetical, but that an appendix containing the kind of school in which the teacher works, opposite his name, should be prepared, and that 'the names of persons qualified to teach in special subjects, *e.g.*, drawing, music, gymnastics, and such purely technical subjects as shorthand, but not possessing the general requirements, should be included in a supplemental register.'

Seven years after the establishment of the register, no unregistered teacher is to be recognised as a teacher in a secondary school.

Training of Teachers.

This important point is not dealt with in anything like a drastic spirit. Emphatic expression is justly given to the opinion that all teachers should be trained in the art, theory, and practice of education, and the universities are exhorted to include this subject in their curriculum, but no demand is made that registered teachers should be trained teachers, since the qualifying diploma may be obtained, as at London University, without any proof as to having gone through a course of school practice. This is a matter which will certainly receive immediate attention if teaching is to be made 'one of the learned professions.'

Then follows the conclusion, every word of which we would fain quote, to do which we must wait for space until next month.

In conclusion, to gain a Minister of Education, a register of teachers, increased scholarships, is much, against which must be set the perpetuation of the dual control of education, the scrambling hither and thither for funds to carry on the new system.

The outcome of it all is in the womb of time, and we must patiently await developments whilst stedfastly endeavouring to perfect the proposed scheme in so far as it seems, from our standpoint, defective, recognising that we are dealing with a document more truly epoch-making than any educational proposals since 1870.

TEACHERS' DRAWING LESSONS.

MODEL.

STANDARD VII.

BY E. BUFFERY RIDGE,

Head Master, Saffron Hill School of Art.

The Triangular Prism (Equilateral).

STANDING upright, and showing two faces equally. Draw the top triangle first, with the edge *ab* horizontal, and *ac* and *bc* equal to each other. Find the length of *ce* by comparing with *ab*; make *ef* vanish with *cb*, and *ed* with *ac*; draw the remaining two *upright* lines *parallel* to *ce*. They will be slightly shorter than *ce*.

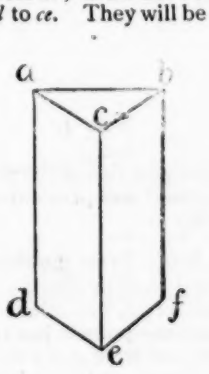

FIG. 1.

Turning the model so as to bring one face at right angles to the line of vision, the top triangle will be

FIG. 2.

similar to *abc* in Fig. 1, but the other way up. At the bottom one horizontal line only will be seen (Fig. 2).

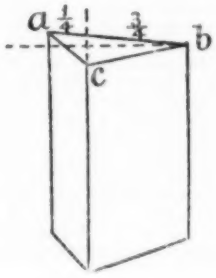

FIG. 3.

Fig. 3 shows another position, no face being directly in front. The top will require some care in drawing; the longest line should be drawn first, the angle at which it recedes being the most important consideration. Then fix the other corner with reference to this line. For instance, *c* is a little below the level of *b*, and directly under a point one-fourth of the distance from *a* to *b*, as shown by the dotted line. Note that the *shortest line* joins the *highest* and *lowest corners*.

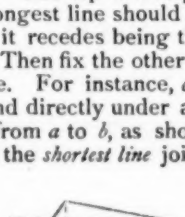

FIG. 4.

In Fig. 4 the longest line of the triangle is in front, and the same method and precautions should be used as in drawing Fig. 3.

Lying on One Side.—Draw the lines *ab*, *bc*, vanishing left and right, and fix their lengths in the usual way. Mark the centre of *ab*, but allowing a little for the nearer part, place the point *d* just beyond the centre. Draw an upright line from *d*, try the length from *d* to *e* as compared with *ab*, and complete the end triangle *aeb*. A line from *e* vanishing with *bc*, meeting another from *c* vanishing with *be*, will finish the figure. The convergence of the vanishing lines must not be great

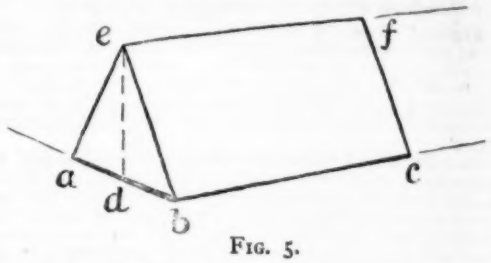

FIG. 5.

enough to affect the apparent parallelism of *be* and *cf*.

The model is difficult to draw when in a *tilted position*. One end will generally be seen, and this should be fixed by its longest line, as in Figs. 3 and 4. Get the direction of the long edges, draw the dotted line shown in Fig. 6 *at right angles to the long edges*, and see that it crosses the shortest line of the triangle. If

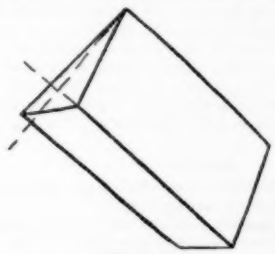

FIG. 6.

the triangle has two lines equal, as in Figs. 1 and 2, there is no need for the dotted line, as the third line (the longest) will be at right angles to the long edges. When the model is sketched, turn the paper so as to bring the figure upright, and see if it seems to stand square.

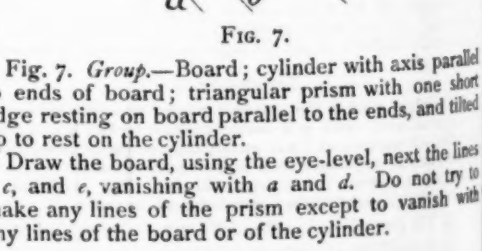

FIG. 7.

Fig. 7. *Group.*—Board; cylinder with axis parallel to ends of board; triangular prism with one short edge resting on board parallel to the ends, and tilted up to rest on the cylinder.

Draw the board, using the eye-level, next the lines *b*, *c*, and *e*, vanishing with *a* and *d*. Do not try to make any lines of the prism except to vanish with any lines of the board or of the cylinder.

Our Science Section.

ELEMENTARY LESSONS IN AGRICULTURAL ZOOLOGY.

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F. L. GREEN,
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CHAPTER IX.—INSECTS (*continued*)—ORTHOPTERA, OR STRAIGHT-WINGED INSECTS.

THIS group is not so generally important in connection with agriculture as the larger one, the beetles, which has formed the subject of the last four articles. It contains, however, several forms which are familiar to us in common experience, as well as many that are not frequently seen.

The Orthoptera are insects having biting mouth parts, and which undergo only an incomplete metamorphosis. Like the beetles they have four wings, and the anterior ones resemble the elytra of the latter class. The hind wings differ somewhat, being composed of a strong shiny membrane, semi-transparent in appearance, and broader than the front ones, so that when the insect is at rest it folds them up, after the fashion of a fan, before covering them with the others. Like so many of the beetles, their food is vegetable in character in the main, though there are some few exceptions.

The chief members of the group which are of interest to agriculturists are the Earwigs, the Cockroaches, the Grasshoppers and Locusts, and the Crickets.

The Earwig (*Forficula auricularia*) is perhaps the most familiar to us all. There is a great prejudice in the minds of nearly all of us against this insect; it has a sad habit of intruding its presence upon us in a most unexpected way from the heart of a flower, or from a crack or wound in a fruit.

It has, too, a very evil reputation; popular superstition associates it with a malignant desire to attack and injure our ears, which is supposed to be the object of the peculiar pincer-like appendages at the end of its abdomen. Formidable weapons they seem, and calculated to inflict serious damage upon the delicate membrane which forms the drum of the ear, and so to entail deafness, if nothing worse. Indeed, some have gone so far in their dislike of the earwig as to say that his ultimate aim is to destroy the reason of anyone unlucky enough to be visited by him.

All this superstition is of course utterly valueless; no such injuries are ever to be looked for; the insect is utterly averse to attacking the ear, nor has it the power to do the damage imputed to it. On the other hand, the earwig presents itself to those who know it as mischievous certainly, but still possessed of many very praiseworthy qualities. It has the habit, almost unparalleled among insects, of watching over its eggs and young ones with what looks like intense affection. When the female has laid her eggs, she lives near them, and will defend them from attack with an utter disregard of her personal safety till the young grubs are able to fight for themselves.

In its general structure the earwig conforms to the general type described above for the group. Its little wing cases are small, black, and shiny, and leave the greater part of its body unprotected. Its most distinctive features are the curious tail-forceps with which the end of its abdomen is furnished. The meaning of this formidable looking appliance comes out when one is seen coming to rest after a flight. The hind wings are very broad and powerful, and upon them it depends for its power of rapid movement. These wings are very liable to injury if unprotected while the earwig is crawling over the plants on which it alights, and must be packed away under the little wing cases placed in front of them. Now it cannot reach the wings with either jaws or feet. An inspection of the insect shows us that it can invert the end of its abdomen over its back. It can thus reach the wings with the tail forceps, and with them it folds them up fan-wise, lifts up the elytra, and pushes the folded wings under their protecting cases. So rapidly does it carry out these somewhat complicated evolutions, that in two or three seconds after alighting the whole thing is complete, and the flying object is transformed into the crawling one. It is only when attacked that the earwig uses these forceps as weapons of defence, and then they are somewhat formidable to its enemies.

The earwig, amiable as it is in its domestic relationship, is nevertheless a serious nuisance to both gardener and farmer. It attacks almost every flower upon which it finds itself, destroying the delicate tissues with its powerful jaws. Its depredations extend also to fruit, for which, especially the sweet and succulent kinds, it has a strong affection. Plums, peaches, and apricots are the principal kinds attacked. It does not, like so many beetles, confine its attentions to particular plants or crops, but is very cosmopolitan in its likes and dislikes. On the other hand, it not infrequently attacks scale insects and other enemies of the farmer, and so does good as well as harm.

The larva of the insect has the same general shape as the adult form. Its wings are not developed of course in that stage, nor are its forceps at all formidable. The pupa is very much like the grub; indeed, this stage is only marked by a gradual development of the parts seen in the perfect insect.

The second family, the Cockroaches (*Blattariæ*), are chiefly to be found indoors. They have a great liking for warmth, and are prone to abound in kitchens, near ovens, and other comfortable situations. They chiefly damage store provisions, and do not make their mark by depredations upon growing crops.

More formidable by far are the members of the next family, the Locusts and Grasshoppers. Of these we may select, as a representative specimen, the Migrating Grasshopper (*Acrydium migratorium*). It is found chiefly in Eastern and Central Europe, being very common in South Russia and Turkey. The insect is of a greenish-gray colour above, and fleshy pink beneath. It is about two inches long, and when its wings are outspread, they measure about two inches and a half from tip to tip. The wing covers are brownish, and often spotted with dark blotches. The hind limbs are long and very muscular, so that it has enormous powers of leaping.

The insect lays its eggs, which are oval and somewhat elongated, in heaps on the earth, generally in meadows. Each produces a very considerable number, so that under favourable conditions its powers of multiplication are extraordinary. The larva on being hatched is wingless. Both larva and adult grasshopper are extremely voracious, and they destroy every green blade of grass which they find in the fields. The adult insects, with their extensive powers of locomotion, often migrate to considerable distances, devastating the country over large areas. They are fortunately very sensitive to cold and damp, and consequently perish with the advent of winter. In more tropical countries the true locusts are a terrible scourge. They travel in enormous numbers, so much so, indeed, that the expression 'a cloud of locusts' is no unmeaning phrase. After a swarm of them has passed over a green area, the change in the country is most astonishing. Every green thing seems to have disappeared, and the earth is left bare and desert-looking.

The last family of the group, the Crickets (*Gryllidæ*), are terribly destructive where they occur, though fortunately they are not very wide-spread. The best known of them, from an agricultural point of view, is the Mole Cricket (*Gryllotalpa vulgaris*), chiefly known on the continent of Europe. It attacks crops of every description, and, being a subterranean feeder, it is very difficult to capture, and therefore very hard to prevent from committing its depredations.

The mole cricket is a fairly large insect, having a length of from one and a half to two inches. Its body is stout and somewhat flattened, and bears long antennæ, palpi, and tail filaments. Its fore legs are broad and modified with formidable digging implements, the use of which has justified its name of mole. The front wings are broad, but short and leathery; the hind wings generally lie along its upper surface, like a couple of tails. Its colour is brown. The habit of the insect is generally subterranean; it scoops out for itself tunnels or passages just below the surface of the ground, and in the course of its burrowing attacks the roots of the plants with which it comes into contact. The digging is done by the fore limbs, which, as we have seen, are curiously modified for that purpose. They are short, thick, and very muscular, and end in stout, strong claws, which scrape through the soil. The body is cylindrical in shape, and this helps it in penetrating the soil, the particles of which have been loosened by the claws and tibiæ of the fore limbs.

The female insect constructs a special burrow in the early summer, which is deeper than the ordinary ones, often extending downwards for nearly six inches from the surface of the ground. At the end of this burrow it constructs a special cell about two inches long by an inch deep, in which are deposited the eggs. The

latter are numerous, being variously estimated at from two to four hundred. When all are laid the insect closes the entrance to the passage, and after about a month the eggs are hatched. The young larvæ are white on first emerging, but soon become dark brown, or almost black. At first they are about the size of ants, to which they bear a superficial resemblance.

They are very voracious and keep feeding for some time, till they are nearly an inch and a half long. During this time they undergo several 'moults.' At first they are fed by the parent, but are capable of independent existence after the second moult. The third moult takes place in the late autumn, and they then hibernate for the winter. In April or May they again undergo the moulting process and become pupæ, the wing cases for the first time being visible. In about June they are transformed into the perfect insects, and can commence reproducing. According to some naturalists they do not generally lay eggs till the second year, hibernating during the winter in burrows deep down in the ground.

The mole cricket has a very bad reputation in one respect; it has distinctly cannibal instincts, and at times indulges them. If two males meet a fight ensues, and the conqueror usually devours his vanquished adversary. It is said that often the female kills and eats many of its offspring, after the latter have become capable of doing without her kindlier ministrations.

The insect may be looked for in cornfields, gardens, meadows, and woods. The tunnels which it digs are very harmful to vegetation, as they disturb the roots of young plants, which are forced upwards, often out of the soil. When not so destroyed they generally wither instead of being able to grow and flourish. Besides this secondary effect of their activity, the insects are harmful on account of their gnawing the roots and underground portions of the plants.

The mole cricket can be destroyed by means of various traps and prisons. Advantage is sometimes taken of its habit of hibernating in warm earth. A pit about two or three feet deep is dug, about the middle of autumn, and filled up with a quantity of fresh horse-dung, which is then covered over with a deep layer of earth. The dung ferments, and considerable warmth is generated thereby; this attracts the mole crickets, and they burrow into it and remain there. They can then be captured by emptying the pit.

To recapitulate, we have seen that—

1. The *Orthoptera* include the earwigs, the cockroaches, the grasshoppers and locusts, and the crickets. They are distinguished by their large hind wings, folded fan-fashion under very small fore wings, and by their biting mouth parts.

2. The earwigs are furnished with curious tail forceps, which are chiefly used to pack the hind wings away under their cases. They chiefly attack flowers and ripe fruits, but sometimes destroy scale insects and other enemies of the farmer.

3. The cockroaches infest warm corners indoors, and destroy stores of provisions.

4. The grasshoppers are characterised by their enormous powers of leaping, as well as by strong and vigorous flight. They are most dangerous in warm or hot countries, where they are often found in large swarms. They prey upon green herbaceous plants, and frequently devastate large tracts of country.

5. The crickets are generally burrowing insects of considerable size; they damage crops by their subterranean tunnels, which deprive the plants of the root-hold which they need, and by eating the roots and other subterranean parts of the plants.

All the group undergo an incomplete metamorphosis, the larva and pupa being very similar in appearance and in voracity.

(*To be continued.*)

SCIENCE NOTES.

THE VINE DISEASE IN FRANCE.—The old disease, commonly known by the name of *Brunissure*, which is so destructive to the vines of the South of France, has recently been reinvestigated, with the result of discovering that it is set up by the attack of a fungus not up to the present suspected of parasitism. Some years ago, when it was first noticed how the leaves of the vines were suffering, Viala and Sauvageau examined them critically, and ascribed the fungus to the genus 'Plasmodiophora.' Debray has now published a very exhaustive account of the pest, based upon recent observations, and comes to a different conclusion as to its exact systematic position. Not only does it attack the vine and leave its imprint upon the leaves, but it makes itself free with plants belonging to 42 natural orders, and assails their roots, branches, and flowers; indeed, every part may be attacked. Microscopic examination shows the fungus in the cells of the plant, and not in the intercellular spaces, as is the case with so many parasites. In these cells the masses of the parasite present most varied appearances; sometimes they are indistinguishable from the living protoplasm; sometimes they can be seen as distinct from the latter, and frequently vacuolated; sometimes again as in spherical homogeneous or vacuolated masses. When they are indistinguishable from the cell protoplasm they can be demonstrated by destroying the latter by the use of *eau de javelle*, and then staining with aniline dyes. From the cells they can migrate, travelling outwards till they reach the surface, over which they spread as a sort of slime. The substance forms a sort of plasmodium; but as it has no nuclei, and forms neither spores nor zoospores, it is now thought to be a form allied to the Vampyrellae and the Myxomycetes. A curious feature of the disease is that it produces no distortion of the host plant.

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SOUTH POLAR EXPLORATION.—The recent successful, or partially successful, expeditions to the Arctic regions, even if they do not succeed in reaching the North Pole, have done good service to geographical exploration. The return of part of the Jackson-Harmsworth expedition with valuable scientific information respecting Franz Josef Land is a noteworthy feature of the year. This, and the exploits of Dr. Nansen, have stirred up again curiosity respecting the ice-bound Antarctic continent, and the minds of explorers are turning towards the fascinating problems it presents. A new expedition is projected by the German Exploration Committee, and at a recent meeting in Berlin the details were considered. It was decided to send out two vessels in the course of next year, and to start from Kerguelan Island. The expedition is expected to be gone three years, and to cost about £50,000.

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THE NEW PROFESSOR OF BOTANY AT CAMBRIDGE.—One of the most marked features of the modern advance of science in England is the encouragement given to it by the Universities. Of the older botanists, perhaps, very few were greater in their time than the late Professor Babington, whose writings on the British flora were so extensive and so reliable. During the last ten years of his life the weight of old age and feeble physical powers withdrew him from the active exercise of his profession. The vacancy caused by his recent death has been filled by the appointment to the Professorship of one of the most active and talented of the younger school, Dr. H. Marshall Ward, F.R.S. Dr. Ward has had a brilliant career, and succeeds in the prime of life to what is perhaps the most important scholastic chair in England. He is an old Cambridge man, having graduated with first-class honours in the Natural Science Tripos of 1879. After finishing his course he went out to Ceylon to investigate a curious disease affecting the coffee plantations, and added greatly to his reputation by his masterly treatment of the subject. On his return he was elected to a fellowship at Christ's College. Since then he has been employed in botanical research at Manchester, and for the last ten or twelve years at Cooper's Hill Royal Engineering College under the Indian Department, where he has held the Professorship of Botany. Dr. Ward is a well-known authority on the new science of bacteriology, for his researches in which he was recently awarded a gold medal by the Royal Society. He has recently been engaged, in conjunction with Professor Percy Frankland, F.R.S., in investigating the bacteria of the water of the River Thames. Dr. Ward is a member of the Council of the Royal Society, and his succession to the Cambridge chair is a matter of congratulation by all English workers in botanical science.

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THE LATE M. PASTEUR.—Unlike many men of note in science in the past, Pasteur received a very hearty recognition during his lifetime. Post mortem honours are, however, accorded to him on all sides. Recently the municipal authorities at Arbois, his birthplace, have determined to erect a statute to his memory. The municipal college there is also to be named after him.

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WAX SECRETING INSECTS.—Certain insects belonging to the Hymenoptera and to the Homoptera have long been known to be capable of forming wax in the course of their life history. According to Dr. Knaggs certain of the Lepidoptera (moths and butterflies) must now be added to the list. Dr. Knaggs has been investigating the habits of *Retinia resinana*, and finds that its larva lines its cells with a waxy secretion. The nature of the cement-like substance which coats their walls has been shown by dissolving off the resin which enters into its composition by treatment with cold rectified spirit, when a clear wax remains. The larva is thought to secrete wax to protect itself from contact with the sticky semi-liquid resin which exudes from the wounds in the buds of the fir trees which it is

found on; in the absence of some such protective substance the probability being that the insect would be immersed in the resinous excretion which flows from the wounded buds.

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DEATH OF PROFESSOR HELLRIEGEL.—Few discoveries in agricultural science in recent years have attracted more attention than the demonstration some ten years ago by Professor Hellriegel that the plants of the natural order Leguminosæ can fix the free nitrogen of the air and render it available for purposes of nutrition. Certain tubercular outgrowths found upon the roots of the plants were found to be caused by a peculiar micro-organism, and somehow in these outgrowths nitrogenous bodies were formed at the expense of atmospheric nitrogen. The fact that the leguminous plants in question when cultivated enriched the soil, so that the succeeding crop was much richer than a similar one grown after any other agricultural plant, has long been known, indeed the fact was noted by old Roman writers on agriculture. It remained, however, for Hellriegel to clear up the matter. All agriculturists as well as botanists will be concerned to hear that the discoverer of this phenomenon has passed away. Hellriegel died on September 24th last, in his sixty-fourth year. He was born in 1831, and after a period of scientific study took charge of the agricultural experiment station at Dahme, where he carried on his work from 1857 to 1873. In the latter year he was appointed to manage the experimental station founded by the Directory of Anhalt at Bernburg. Here the great discovery was made after ten years of laborious work, and was communicated to the world in 1886 by himself and his colleague Dr. Wilfarth. For his distinguished and brilliant researches Professor Hellriegel was made an honorary member of the Royal Agricultural Society of England, and Foreign Associate of the Soc. Nat. d'Agriculture of France.

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ACTION OF ALKALOIDS ON PLANTS.—Sig. A. Marcacci has carried out a series of experiments on the action of alkaloids on the growth of plants, and finds the results to vary under different conditions. While quinine arrests the transformation of starch into sugar without access of light, strychnine produces the same effect only under the influence of light, and morphine does not completely arrest the transformation even in the presence of light. From these results the author draws the conclusion that the process is not a simple chemical one, but is dependant on other forces not yet fully investigated.

CHEMISTRY NOTES.

BY W. TATE, A.R.C.S., F.C.S.

GENERAL NOTES.—The specific heat of hydrogen peroxide has been determined by W. Spring, by the radiation method. He finds it to be 0·6893, when determined by means of a solution containing 74·54 per cent. of the peroxide, making allowance for the water present.

Experiments by C. Hoitsema indicate that the absorption of hydrogen by palladium cannot be longer viewed as being due to the formation of a compound Pd_2H. The action taking place is rather that of a solution of the gas in the solid.

Argon and fluorine do not combine even under the influence of the electric spark, neither does argon act upon heated titanium, boron, lithium, or uranium.

The *alkali metals* may be prepared by distilling their aluminates with metallic magnesium. Cœsium hydrate, for instance, is heated with aluminium hydrate to redness, and the resulting mass distilled from an iron tube with the required quantity of magnesium. Cœsium has the specific gravity 2·366, and consequently its atomic volume is 56.

Silicon may be obtained by heating finely powdered silica with finely powdered aluminium. Incandescence occurs, and the amorphous silicon produced is left as a residue on treating the mass with hydrochloric, sulphuric, and hydrofluoric acids successively. Crystallized silicon is obtained by heating silica with aluminium in the electric furnace. It forms thin, hexagonal plates, which are yellow and transparent when very thin. They do not act on polarized light.

Crystalline aluminium chloride may be prepared by dissolving the commercial salt in water, filtering the solution through glass wool, and mixing the filtered solution with concentrated hydrochloric acid. The mixture is cooled by a freezing mixture and saturated with dry hydrogen chloride. The crystals, which rapidly form, are washed by decantation with concentrated hydrochloric acid until free from iron, and the excess of acid is removed as far as possible by means of a filter pump. These crystals have the composition $AlCl_3.6H_2O$. They consist of hexagonal prisms terminated by rhombohedral faces.

Lead sulphide volatilizes completely at 860° in a current of nitrogen, owing to the considerable vapour pressure it exerts far below its melting point, which may be put at 935°. Mixtures of lead sulphide and lead monoxide or sulphate, when heated in porcelain tubes in an atmosphere of nitrogen, give data which confirm the equations—

$$(1)\quad PbS + 2PbO = 3Pb + SO_2.$$
$$(2)\quad PbS + PbSO_4 = 2Pb + 2SO_2.$$
$$(3)\quad PbS + 3PbSO_4 = 4PbO + 4SO_2.$$

Nitric peroxide gives a somewhat stable, white compound, with a chloroform solution of antimony trichloride. It probably has the composition—

$$2NO_2\begin{cases}(O.SbO)_2.\\(O.SbOCl_2)_2.\end{cases}$$

PRACTICAL NOTES.—Magnesium forms an insoluble oxide and a very characteristic double phosphate with ammonium; most of its other compounds are soluble either in water alone or in solutions of ammonium salts.

The insoluble oxide of magnesium affords a ready means of separating magnesium from sodium and potassium. The separation may be accomplished in three useful ways:—

1. Freshly precipitated and well-washed mercuric oxide is added to the solution containing a magnesium salt and potassium or sodium compounds. The whole is evaporated to dryness and strongly ignited, when mercury salts and oxide are volatilized and alkali salts and insoluble magnesium oxide remain. The reaction takes place in accordance with the equation—

$$MgCl_2 + HgO = MgO + HgCl_2.$$

The alkali salts are dissolved in water, filtered from the residue of MgO, and evaporated to a small bulk before testing for potassium.

The conversion of salts into oxides by means of mercuric oxide is of great use in analysis in many other cases as well as with magnesium, on account of the ease with which the corresponding mercury salt may be driven off by heat.

2. Magnesium hydrate is precipitated by addition of a solution of barium hydrate and filtered off—

$$MgCl_2 + BaH_2O_2 = MgH_2O_2 + BaCl_2.$$

The excess of barium hydrates and the barium salt formed are then precipitated as carbonate by addition of ammonium carbonate—

$$BaCl_2 + 2AmHCO_3 = BaCO_3 + 2AmCl + H_2O + CO_2$$
$$BaH_2O_2 + AmHCO_3 = BaCO_3 + AmOH + H_2O.$$

The barium carbonate is filtered off, and the filtrate carried to dryness and ignited to expel ammonium salts. The residue contains alkaline salts free from magnesium.

3. The third method of separation of magnesium as oxide consists in the evaporation of the solution to dryness, with excess of ammonium carbonate and subsequent ignition of the residue. The magnesium carbonate first formed is decomposed, thus:—

$$MgCO_3 = MgO + CO_2.$$

The residue is extracted with water, the solution filtered off, and again evaporated with ammonium carbonate and ignited to separate a small quantity of magnesium escaping the first operation. The solution of the residue contains alkali salts only. Of the three methods, No. 1 is the best, provided due care be taken to obtain mercuric oxide which leaves no residue on ignition.

The characteristic ammonium magnesium phosphate is not available for the separation of magnesium from potassium or sodium, as it requires the use of an excess of salts of a non-volatile acid. The non-volatile phosphoric acid would remain as a residue after ignition, even if ammonium salts were used for the precipitation of magnesium. This acid interferes with the further test for potassium as platinichloride, as it is precipitated by alcohol as alkaline phosphate. As a test for magnesium, or for the quantitative estimation of this metal, the double salt is, however, peculiarly suitable.

Ammonium magnesium phosphate, $AmMgPO_4$, is a white crystalline substance, somewhat soluble in water, but quite insoluble in aqueous ammonia.

The conditions to be observed in its precipitation are:—

1. Ammonium chloride must be present in sufficient quantity to prevent the precipitation of magnesium hydrate.

2. Aqueous ammonia must be added until the solution smells strongly of ammonia (to decrease the solubility of the precipitate).

3. Sodium hydrogen phosphate, microcosmic salt solution, or a solution of ammonium phosphate, should be added in drops with vigorous agitation after each addition, until no further precipitate is produced.

The Second Stage of the Practical Examination in Chemistry now includes the quantitative estimation of one substance by means of a previously prepared volumetric solution.

The volumetric work which may reasonably be expected from students taking this stage depends upon comparatively few reactions, and consequently may be systematically studied by means of a few type-analyses.

These reactions may be classed as follows :—

1. *Neutralisation reactions* involving a knowledge of (*a*) the mutual action of acids and alkalies, (*b*) the action of acids and alkalies and the more common salts on *indicators*, (*c*) the action of acids on carbonates, and of alkalies on solutions of metallic salts.

2. *Oxidation and Reduction reactions* requiring acquaintance with (*a*) the methods of bringing the substance to be analysed into the proper state of oxidation, (*b*) the conditions under which potassium permanganate acts as an oxidizing agent, (*c*) the conditions under which hydriodic acid acts as a reducing agent.

3. *Precipitation reactions* including (*a*) precipitation by silver nitrate, (*b*) the use of potassium chromate as an indicator for silver.

The methods of using volumetric apparatus must be studied in order to give certainty and ease in the manipulation required.

Type-analyses may be arranged as follows :—

1. Determine the amount of Na_2CO_3 present in a well-crystallized sample of washing soda, using (*a*) litmus solution, (*b*) methyl-orange solution as indicator.

2. Determine the amount of calcium present in a clear sample of calcite by dissolving in an excess of standard acid and titrating the excess of acid with standard ammonia.

3. Determine the percentage of copper in crystallized copper sulphate by precipitation with excess of standard sodium hydrate and estimation of the excess by standard acid.

4. Find the percentage of iron in ferrous ammonium sulphate by means of standard potassium permanganate solution.

5. By the same means, determine the oxalic acid in a freshly-crystallized sample of ammonium oxalate.

6. Determine the quantity of potassium permanganate in a given solution by addition of potassium iodide and dilute pure sulphuric acid, and titration of the liberated iodine with standard solution of sodium thiosulphate.

7. Estimate the percentage of chlorine in sodium chloride by means of standard silver nitrate.

These notes will contain a brief account of the chemistry of the reactions involved, and, in due course, sufficiently full instructions for carrying out the various reactions.

Questions.

6. Point out the methods of separating magnesium from potassium, and show clearly what are the advantages of the method you prefer.

7. Give a concise account of the process of making sulphuric acid, and trace the reactions occurring in the various parts of the appliances used.

8. Illustrate the law of multiple proportions by a proof derived from a consideration of the oxides of nitrogen.

9. Discuss the precautions necessary when precipitating arsenic, antimony, and tin, by means of hydrogen sulphide.

10. What is the use of a knowledge of the specific heat of any element to chemists? How would you proceed with everyday means to determine the specific heat of copper.

11. What is a reversible reaction? Give illustrations of reversible reactions from your laboratory experience.

MAGNETISM AND ELECTRICITY.

BY EDWIN EDSER, A.R.C.S.

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LEAVING, for a moment, the subject of galvanometers, it will be noticed that we now have the necessary knowledge to enable us to determine either the magnetic moment of a magnet, or the value of the earth's horizontal magnetic force at any place. For if a magnet be suspended by a torsionless fibre so as to be free to oscillate in the earth's field, the time T occupied in one complete vibration will be given by the equation—

$$T = 2\pi\sqrt{\frac{I}{MH}} \quad (1)$$

$$\therefore MH = \frac{4\pi^2 I}{T^2}.$$

The value of I depends on the mass and the dimensions of the magnet. For a bar of circular cross section of mass = m, length = l, and radius = r,

$$I = m\left(\frac{l^2}{12} + \frac{r^2}{4}\right)$$

For a bar of rectangular cross section, the mass and length being indicated by the same letters as before, and b denoting the breadth, measured horizontally in the position in which the magnet is suspended,

$$I = m\left(\frac{l^2 + b^2}{12}\right).$$

In the C.G.S. system the mass is, of course, measured in grams, whilst the linear measurements are in centimetres.

I being calculated, and T being observed, we shall then have an equation to determine product MH, supposing the angular displacement from the zero position of the suspended magnet to be small at the extremities of its oscillation.

Referring back to the article dealing with the magnetic field generated by a permanent magnet, it will be found that the field F at a point at a distance d measured at right angles from the centre of the magnet (supposed of length = l),

$$F = \frac{M}{\left(d^2 + \frac{l^2}{4}\right)^{\frac{3}{2}}} = \frac{M}{D^3},$$

where $D = \left(d^2 + \frac{l^2}{4}\right)^{\frac{1}{2}}$, or the distance of the point from one pole of the magnet.

Let then a small magnetic needle be suspended by a torsionless fibre in the earth's field and allowed to come to rest, and our experimental magnet be placed with its axis in the direction from east to west, due north or south of it, then the field generated at the position of the suspended needle by the magnet will be at right angles to the earth's horizontal magnetic component. The suspended needle will be deflected and come to rest at an angle θ, say, from its former position; then equating the moments of the forces acting on its poles, we shall have—

$$F\cos\theta = H\sin\theta.$$

Substituting the value of F given above, and making the necessary algebraical transformations, we shall have—

$$\frac{M}{H} = D^3\tan\theta. \quad (2)$$

Since the value of $\tan\theta$ varies rapidly with θ when the latter has any value above 45°, θ should not be made greater than the latter value.

Multiplying (1) by (2) we get

$$M^2 = \frac{4\pi^2 I}{T^2}\cdot D^3\tan\theta$$

$$\therefore M = \frac{2\pi}{T}\sqrt{ID^3\tan\theta},$$

which determines M.

Dividing (1) by (2), and taking the square root of both sides, we have

$$H = \frac{2\pi}{T}\sqrt{\frac{I}{D^3\tan\theta}},$$

which determines H.

This is Gauss' method of determining the values of M and H, and is that usually employed in magnetic observatories. By the aid of the Kew magnetometer, an instrument specially constructed to

facilitate the above operations, Professors Rücker and Thorpe have determined the values of H at stations distributed throughout the British Isles.

Returning now to the galvanometer, suppose that it has to be used ballistically; for example, that we wish to determine by means of the swing of the galvanometer needle the quantity of electricity which passes when a condenser is charged or discharged through it.

It was found in an earlier paper that the angular reflection θ of a tangent galvanometer needle was connected with the current C passing through the coils, n in number, each of radius r, by the equation

$$\frac{2\pi n C}{r} = H \tan \theta,$$

which may be written

$$C = \frac{H}{G} \tan \theta,$$

where

$$G = \frac{2\pi n}{r},$$

i.e., the field at the centre of the coils due to unit current passing through them.

In what follows G will be supposed to have the same significance in connection with the reflecting galvanometer under consideration.

Let C be the current passing through the coils at any instant; then the impulse communicated in a small time t to one of the poles of the small suspended magnet (pole strength $= m$, length $= l$) will be $CGm \times t$. If the current has ceased flowing before the suspended magnet has moved appreciably, we shall have the total impulse $= \Sigma CGmt = Gm\Sigma Ct$, where the symbol Σ indicates summation. But it is easily seen that ΣCt (*i.e.*, the sum of the products of the current at any instant, into the time during which it flowed) $= Q$, the total quantity of electricity that passed.

$\therefore$ Total impulse $= GmQ =$ momentum communicated to one pole.

$\therefore$ Total momentum communicated to suspended system $= 2GmQ$.

Also, the moment of momentum $= 2GmQ \times \frac{l}{2} = GQM$, if M = magnetic moment of suspended magnet.

If this momentum generates an angular velocity $= \omega$ in the suspended system, supposed to have a moment of inertia $= I$ about the axis of suspension, then the moment of momentum will also equal $I\omega$.

$$\therefore I\omega = GQM. \quad (3)$$

Also, the kinetic energy of the system $= \frac{1}{2}I\omega^2$. This will be equal to the potential energy at the end of the swing $= MH\frac{\theta^2}{2}$ by reasoning similar to that used on former occasions, θ denoting the angle that the body has rotated through.

$$\therefore \tfrac{1}{2}I\omega^2 = \tfrac{1}{2}MH\theta^2. \quad (4)$$

Substituting for ω from (3)

$$I\left(\frac{GQM}{I}\right)^2 = MH\theta^2;$$

$$\therefore Q^2 = \frac{IH\theta^2}{G^2M} = \frac{IH^2\theta^2}{G^2MH};$$

$$\therefore \text{from (1)} \quad Q = \frac{H\theta}{G}\sqrt{\frac{I}{MH}} = \frac{HT}{2\pi G}\theta, \quad (5)$$

where T = the time of one complete oscillation.

From this we see that the first swing of the galvanometer needle (supposing that the frictional retardation is negligibly small) is proportional to the quantity of electricity that passes through the galvanometer.

Suppose two condensers (of capacity K_1 and K_2 respectively) to be charged to the same potential V, and successively discharged through the galvanometer. Let the observed throws be θ_1 and θ_2. Then, since

$$\frac{Q}{V} = K,$$

$$VK_1 = \frac{HT}{2\pi G}\theta_1,$$

$$VK_2 = \frac{HT}{2\pi G}\theta_2.$$

$$\therefore \frac{K_1}{K_2} = \frac{\theta_1}{\theta_2},$$

or the throws are proportional to the capacities.

It can be left to the student to prove that if the same condenser be charged to different potentials, the throws of the needle (when the condenser is discharged through the galvanometer) are proportional to the respective potentials.

We have, then, a method either for comparing capacities, or E.M.F.'s, by means of the ballistic galvanometer.

The value of the above method of comparing the E.M.F.'s of cells is due to the fact that only an instantaneous current is required to charge the condenser, and that consequently there is no fear of polarization.

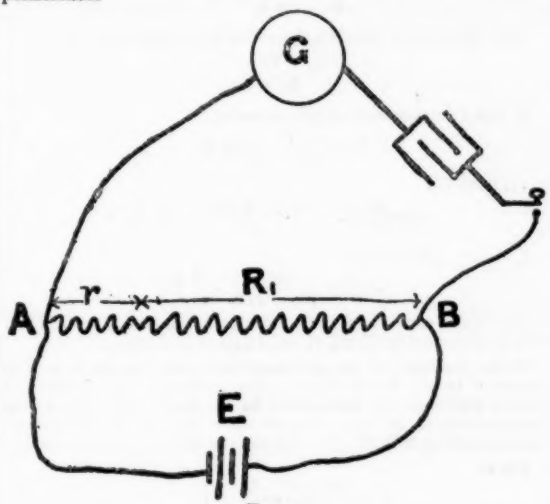

FIG. 1.

ABSOLUTE CAPACITY OF CONDENSER.

A suitable number of cells, E, capable of sending a small current without polarising, are connected up through a resistance, R and r, of about 10,000 ohms. One terminal of a high resistance ballistic galvanometer, G, is connected directly to A, one end of the resistance; the other terminal is connected through the condenser C (whose capacity is to be determined), and a key D, to the other end of the resistance. If the condenser is discharged to start with, on depressing the key D, a quantity Q of electricity will pass through the galvanometer, producing a throw of the needle. Let this throw $= \theta_1$.

Then

$$Q = VK = \frac{HT}{2\pi G}\theta_1, \quad (6)$$

where V = the E.M.F. between A and B.

T, the time of vibration of the needle, is now obtained as accurately as possible. The only unknown factors in the equation are now V, H, and G.

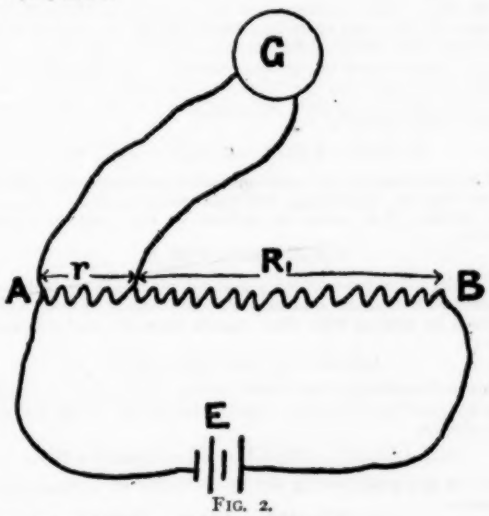

FIG. 2.

To eliminate these, connect up as in Fig. 2.

The resistance of the galvanometer is supposed so high, that connecting it to the ends of the resistance r will make no appreciable difference in the current flowing through the resistance R_1.

Let C = current now flowing through the galvanometer. Then, if θ_2 = steady deflection,

$$C = \frac{H}{G}\theta_2. \quad (7)$$

Dividing (6) by (7):

$$\frac{VK}{C} = \frac{T}{2\pi}\frac{\theta_1}{\theta_2}. \quad (8)$$

Also, the E.M.F. between the end of the resistance r

$$= \frac{Vr}{R_1 + r}.$$

If then R = resistance of galvanometer,

$$C = \left(\frac{Vr}{R_1 + r}\right) \div R.$$

$\therefore$, from (8),

$$\frac{VK}{\frac{Vr}{(R_1 + r)R}} = \frac{K(R_1 + r)R}{r} = \frac{T}{2\pi}\frac{\theta_1}{\theta_2}.$$

$$\therefore K = \frac{r}{(R_1 + r)R} \cdot \frac{T}{2\pi}\frac{\theta_1}{\theta_2}.$$

Hence the capacity of the condenser is completely determined. If R be measured in Ohms, K will be given in Farads.

If the resistance of the galvanometer be not known, it may be measured by the Wheatstone's bridge method, or by inserting a known resistance R_2 comparable in magnitude with that of the galvanometer G in series with the latter, the rest of the connections remaining as in Fig. 2. Let the steady deflection now be θ_3.

Then

$$\frac{\theta_2}{\theta_3} = \frac{R_2 + R}{R} = \frac{R_2}{R} + 1.$$

$$\therefore \frac{R_2}{R} = \frac{\theta_2}{\theta_3} - 1 = \frac{\theta_2 - \theta_3}{\theta_3}.$$

$$\therefore R = \frac{R_2\,\theta_3}{\theta_2 - \theta_3}.$$

The above is Fleming Jenkin's method of determining the absolute capacity of a condenser.

ORGANIC CHEMISTRY NOTES.

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We shall now deal with certain of the alkaloïds, using the term in the stricter sense mentioned in the last article. The alkaloïds, conine, nicotine, and sparteine, which contain no oxygen, will be first dealt with, though before treating of these, piperidine, a product of the hydrolysis of piperine (the alkaloïd of pepper), must be considered. Piperine crystallises in prisms of m.p. 129°; boiled with alkalies it is resolved into piperidine, $C_5H_{11}N$, and a salt of piperic acid, $C_{12}H_{10}O_4$.

$$C_{17}H_{19}NO_3 + KOH = C_5H_{11}N + C_{12}H_9O_4K.$$

That piperidine is a hexahydropyridine follows from the following considerations. Ladenburg and Roth added 75 grams sodium to a hot solution of 20 grams of pyridine in 150 grams of absolute alcohol.

$$C_5H_5N + 6H = C_5H_{11}N.$$

On the other hand, Königs oxidised piperidine to pyridine by heating with sulphuric acid to 300°. The oxidation may also be effected by heating with silver acetate in acetic acid solution to 180°.

$$C_5H_{11}N + 3O = C_5H_5N + 3H_2O.$$

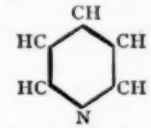
Again Ladenburg prepared this base by adding 4 parts of sodium to a hot solution of 1 part of trimethylenecyanide in 8 parts of absolute alcohol,

$$CN.CH_2.CH_2.CH_2.CN + 8H = C_5H_{11}N + NH_3,$$

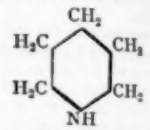
and also by rapidly heating the hydrochloride of pentamethylenediamine.

$$C_5H_{10}(NH_2)_2HCl = NH_4Cl + C_5H_{11}N.$$

From these reactions it is clear that piperidine and pyridine must be related in the way shown by the formulæ—



Pyridine.



Piperidine.

This represents piperidine as a secondary base, which agrees well with its behaviour. The hydrogen atom of the imido group may be replaced by acid radicles. Nitrous acid produces nitrosopiperidine $C_5H_{10}N.NO$, capable of reduction to the corresponding hydrazine $C_5H_{10}N.NH_2$ (characteristic behaviour of secondary bases). Piperidine unites very easily with methyl iodide to form the salt $C_5H_{10}NHCH_3I$; from this alkali liberates *n*-methylpiperidine $C_5H_{10}NCH_3$. Cahours found that the latter substance combined with a further molecule of methyl iodide at 100°; Hofmann obtained the same compound more easily by digestion of piperidine with methyl iodide. The corresponding dimethylpiperidine hydroxide, $C_5H_{10}N(CH_3)_2OH$, does not decompose backwards on distillation, but gives a base of the fatty (open chain) series, the so-called dimethylpiperidine, $C_7H_{15}N$.

$$C_5H_{10}N(CH_3)_2OH = H_2O + C_7H_{15}N[C_5H_9N(CH_3)_2].$$

This tertiary base yields an ammonium iodide with methyl iodide.

$$C_5H_9N(CH_3)_2 + CH_3I = N(C_5H_9)(CH_3)_3I,$$

which on distillation breaks up into trimethylamine, hydrogen iodide, and a hydrocarbon piperylene C_5H_8.

$$N(C_5H_9)(CH_3)_3I = N(CH_3)_3 + HI + C_5H_8.$$

Conine, $C_8H_{17}N$, occurs in all parts of the hemlock (*conium maculatum*), but especially in the seeds. The seeds are extracted with dilute acetic acid, the solution evaporated to a syrup in vacuo, and then treated with magnesia and shaken with ether. The ethereal solution is next dried with potassium carbonate, and then distilled. Conine, which has the boiling point 166°–166·5°, passes over before conhydrine, $C_8H_{17}NO$, which has the boiling point 240°. Conine is lighter than water, spec. grav. ·8625 at 0°, and according to Schorm dissolves in 90 parts of water, whilst it will itself take up 25 per cent. of water. It is easily soluble in ether, mixes with absolute alcohol in all proportions, is very volatile and extremely poisonous. Damp conine gives a strongly alkaline reaction, many salts of the base have been prepared.

The reactions of conine are very similar to those of piperidine, it gives nitroso- and benzoyl derivatives ($C_8H_{16}N.NO$ and $C_8H_{16}N.C_7H_5O$), and exhibits a similar behaviour towards methyl iodide. By this means methylconine, $C_8H_{16}N.CH_3$, dimethylconine iodide, $C_8H_{16}N(CH_3)_2I$, and dimethylconine, $C_8H_{15}N(CH_3)_2$, have been prepared. The latter substance unites with more methyl iodide to form trimethylconylium iodide, $N(C_8H_{15})(CH_3)_3I$, from which the hydroxide may be prepared by treatment with moist silver oxide. This compound breaks up in two ways on heating, dimethylconine and methyl alcohol being formed according to the reaction

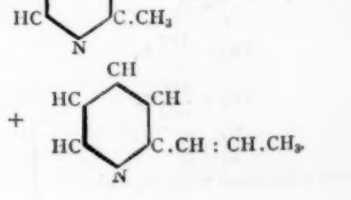
$$N(C_8H_{15})(CH_3)_3OH = N(C_8H_{15})(CH_3)_2 + CH_3OH;$$

whilst, on the other hand, trimethylamine, water, and conylene, C_8H_{14}, result

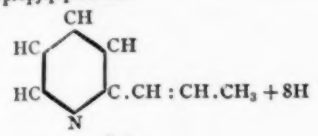
$$N(C_8H_{15})(CH_3)_3OH = N(CH_3)_3 + H_2O + C_8H_{14}.$$

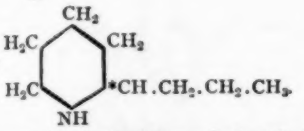
Since the behaviour of piperidine and conine is so similar, it is but natural to look on conine as an alkyl derivative of piperidine; it might, for instance, be a propylpiperidine, $C_5H_9(C_3H_7)NH$ (or, of course, isopropyl, methylethyl, or trimethyl derivative). That conine is a normal propylpiperidine in which an α-hydrogen atom of the piperidene is replaced by the propyl group, was proved by Ladenburg (*Annalen Bd.* 247).

α-Allylpyridine was prepared by heating α-picoline with paraldehyde to 250°–260°, the paraldehyde reacting as acetaldehyde in the following manner :—



On boiling this substance with sodium and alcohol, reduction took place, and a base, having the formula $C_9H_{17}N$ was produced; this must be an α-propylpiperidine.





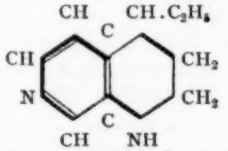
Although this base behaved chemically and physiologically as the naturally occurring conine, yet it differed from it physically in that it had no action on polarised light, whilst natural conine is dextrorotatory. The synthetical conine is seen in the above formula to have an asymmetric carbon atom (marked *), and in a synthetical product it is equally likely to get right and left handed molecules, so that they are produced in equal quantities and the resulting compound is inactive. The separation into dextro- and laevo-rotatory conine was effected by Ladenburg by evaporating rapidly a solution of α-propylpiperidine bitartrate until it was very concentrated, and then adding some conine bitartrate, $C_9H_{17}N.C_4H_6O_6 + 2H_2O$, prepared from the naturally occurring conine. In this way a gradual crystallisation of conine bitartrate, identical with that obtained from th natural alkaloïd, was occasioned, whilst the mother liquor contained the bitartrate of a laevo-rotatory conine.

Nicotine, $C_{10}H_{14}N_2$, occurs as malate in tobacco leaves. In order to obtain the free base the leaves are cut up, covered with water, and allowed to stand for 24 hours; the liquid is then heated to boiling by blowing in steam for half an hour, and the liquid separated from the solid residue, which is again treated in the same way. The aqueous extracts are then concentrated until reduced to one-third of their previous volume, and treated with slaked lime (the CaO is one-tenth of the tobacco worked up), and then distilled. The distillate is treated with oxalic acid until it has a slight acid reaction, evaporated on the water bath until it forms a thin syrup, and the saline mass which separates is decomposed by potash. The nicotine separates and is removed, the mother liquor can be extracted with ether, finally the ether is removed from the ethereal solution of nicotine by distillation, and all the nicotine is subjected to fractional distillation in steam. In all cases indiarubber joints and stoppers must be avoided when working with nicotine.

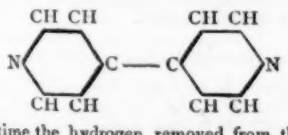
Nicotine forms a colourless narcotic smelling liquid which is dextrorotatory, very slightly heavier than water, and boils at 246–7° at 745 m.m. pressure.

Nicotine is oxidised by nitric or chromic acids or by potassium permanganate to nicotinic acid, which has the constitution of β-pyridinecarboxylic acid, $C_5H_4N.CO_2H$.

Various constitutional formulæ have been assigned to nicotine; that given in the second edition of '*Beilstein's Handbook*' is—



This formula has been favoured by Étard, but, as we shall see later, cannot be correct. At one time it was thought that nicotine might be a hexahydrodipyridyl, *i.e.* dipyridyl $C_5H_4N.C_5H_4N$, to which 6 atoms of hydrogen had been added. Anderson showed that sodium reacts with pyridine, giving a compound which he supposed to have the composition $C_{10}H_{10}N_2$, *i.e.* he looked on it as a polymer of pyridine. Weidel and Russo have studied the reaction more carefully. Anderson's compound appears to be a paradipyridyl—



At the same time the hydrogen removed from the pyridine acts as a reducing agent on some of the dipyridyl with the result that dihydro- and hexhydro- derivatives are produced. The latter, which has the formula $C_{10}H_{14}N_2$, is isomeric with nicotine, but not so poisonous as the latter. Other dipyridyls have been produced by Skraup by heating meta- and para-phenylene diamines with glycerine, sulphuric acid, and nitrobenzene; in this way he obtained phenanthrolines of the formulæ :—

Phenanthroline.

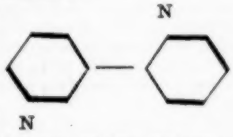
and

Pseudo- or Iso-phenanthroline;

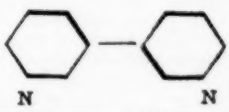
which, when oxidised, yielded dipyridyldicarboxylic acids,

$$C_{10}H_6N_2(CO_2H)_2;$$

the latter substances heated with lime gave dipyridyls of the formulæ :—

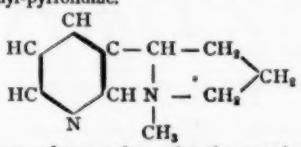


and



However, neither of these when reduced by nascent hydrogen is capable of conversion into nicotine.

In a series of papers in the *Berichte* (24. 61, 1373; 25. 1428, 2807; 26. 292, 765, 2135; 27. 1053; 28. 456), Pinner has recently shown that nicotine most probably has the constitution of pyridyl-*n*-methyl-pyrrolidine.



At first Pinner endeavoured to solve the question of the constitution of nicotine by subjecting the base to a gentle oxidation. Using hydrogen peroxide, he obtained a substance, to which he assigned the name and formula 'oxynicotine,' $C_{10}H_{12}N_2O$; this base was not analysed itself, but only in the form of its chlorplatinate and picrate. At the time he prepared the substance, Pinner was doubtful as to whether it might not really be $C_{10}H_{14}N_2O$; in fact, he later on altered the formula to the latter. By heating oxynicotine for some time with hydrochloric acid at 140°, Pinner obtained the hydrochloride of a base (pseudonicotine oxide), which when distilled yielded 'dehydronicotine,' to which he assigned the formula, $C_{10}H_{12}N_2$. As no useful result was arrived at by the oxidation of nicotine, Pinner next turned his attention to the action of bromine on the base, this subject having previously been studied by various chemists. Huber (*Annalen*, 131. 257) had described crystals, to which he assigned the formula $C_{10}H_{12}Br_2N_2.HBr_3$.

(*To be continued.*)

NOTES ON PHYSIOLOGY,

EMBRACING THE SUBJECTS OF THE ADVANCED AND HONOURS STAGES, SCIENCE AND ART DEPARTMENT.

BY WALKER OVEREND, M.A., M.D. (OXON.), B.SC. (LOND.),

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The sympathetic system of nerves consists of two long nerve cords, situated close to the vertebral column in the neck, thorax, and abdomen. At certain intervals there are thickenings called *ganglia*, which contain ganglion cells. The spinal nerve-roots—anterior and posterior—unite to form a mixed spinal nerve, and each spinal nerve thus formed sends a branch to the sympathetic ganglion nearest to it, which is termed the communicating branch (*ramus communicans*) These rami communicantes consist of very fine nerve fibres, destined to supply the blood-vessels and the unstriped muscular fibre of the viscera, the pupil, and the muscular fibres of the heart. These nerves are originally in connection with groups of ganglion cells in the medulla oblongata, and especially the large or general vaso-motor centre. Those supplying the heart, when stimulated, produce increased force and frequency of the beats, and are, therefore, called *augmenting* and *accelerating* nerves. Certain of the ganglia in

the thorax send off branches, which unite to form the *splanchnic* nerves. These are distributed to the vessels of the abdomen, and to the small and large intestines, stomach, kidneys, etc. They form a very large and intricate network behind the stomach called the *solar plexus*. When the splanchnic nerves are divided, there is an immense dilatation of the blood-vessels supplying the intestines, and a considerable fall of blood-pressure. Hence the splanchnics carry vaso-constricting nerves to these organs. The splanchnics also carry nerve fibres to the unstriped muscle of the wall of the intestine, which inhibit or restrain its peristaltic movements.

From the general vasomotor centre fibres, no doubt, pass upwards to the cerebrum, particularly the motor centres, since emotional conditions readily influence the condition of the blood-vessels, producing pallor or redness as the case may be.

The central canal of the spinal cord—which contains cerebro-spinal fluid—becomes wider when it reaches the medulla and pons, and this expansion is termed the fourth ventricle (*d* and *e* in the figure here reproduced). The floor of the division marked *c* is termed the *crura cerebri*, and the roof the optic lobes or corpora quadrigemina, since there are four of these in the higher animals. The cavity contained in this division is called the *iter*, since it leads from the fourth

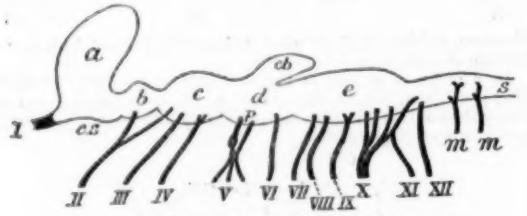


FIG. 1.—Sketch of brain at an early stage of development. I.—XII., cranial nerves.

ventricle to the cavity within the optic thalamus (*b*), which is the third ventricle. The central hemispheres themselves also contain cavities filled with fluid, called the first and second, or the lateral ventricles. They communicate by narrow openings with the third ventricles. The floor of the first portion of the brain (*a*) is formed by the *corpora striata*. In the process of development, the corpora striata become separated, so that each appears to lie on the outside of the optic thalamus as well as in front of it. Fibres coming from the crus cerebri on each side run between the corpus striatum and optic thalamus, and pass to the cerebrum. This strand of fibres is called the *Internal Capsule*.

The ventricles of the brain contain cerebrospinal fluid, which is somewhat like lymph in its physical characters, but it does not contain any cells and does not coagulate.

The dura mater is a tough connective tissue layer, attached firmly to the interior of the cranium, but lies loosely in the spinal column. *The pia mater* is a fine vascular membrane, closely adherent to the surface of the brain and spinal cord. Between the pia and dura mater there is a space divided into two by the *arachnoid* membrane, and there is a fluid between the dura mater and the arachnoid, and between the arachnoid and the pia mater. In the roof of the fourth ventricle there is a small opening, by means of which these spaces are placed into communication with the cavities of the brain and spinal cord.

The Minute Structure of the Cerebral Cortex.

The cortex is the grey matter of the cerebral hemispheres, and is external, while in the spinal cord, the grey matter lies internal. The cortical substance consists of cells and fibres embedded in a fine connective tissue or neuroglia. The cells vary in shape, being spherical, star-shaped, or pyramidal, and they are separated by the fibres passing towards the surface of the cortex from the white substance in the interior of the cerebrum. The cortex may be divided into five layers, the most superficial layer consists of nerve fibres and of a few scattered nerve cells without processes. In the next layer the cells are small, angular, and possess processes. In the third layer there are also large pyramidal nerve cells. In some parts of the brain, as around the fissure of Rolando, there are very large *giant* cells, each of which possesses one process which passes down to the white substance and becomes a nerve fibre. The fourth and fifth layers contain angular cells, with fine processes and some bipolar cells.

The Relations of the Olfactory Bulb. The Central Connections of the Optic Nerves.

The olfactory bulb lies on the face of the anterior lobes, on either side of the anterior fissure beneath. Its roots really spring from a convolution in the interior called *uncinate*, and one root passes in to the anterior commissure in the third ventricle. From the bulb several filaments pass into the olfactory mucous membrane (see paragraphs 195, 196, and 197 of Author's 'Textbook on Physiology').

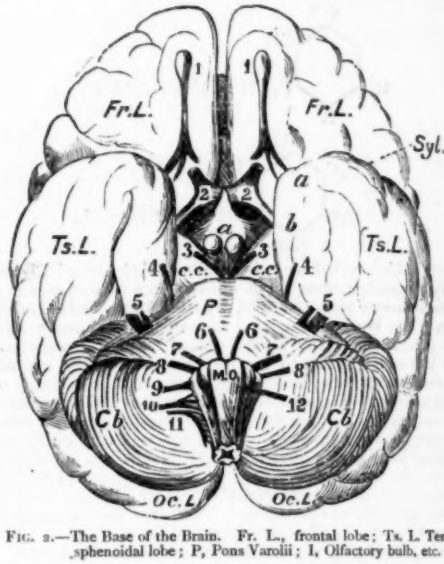


FIG. 2.—The Base of the Brain. Fr. L., frontal lobe; Ts. L. Temporo-sphenoidal lobe; P, Pons Varolii; I, Olfactory bulb, etc.

The optic nerves are devoted entirely to the sense of vision. The two nerves join after leaving the eye, to form the chiasma. From

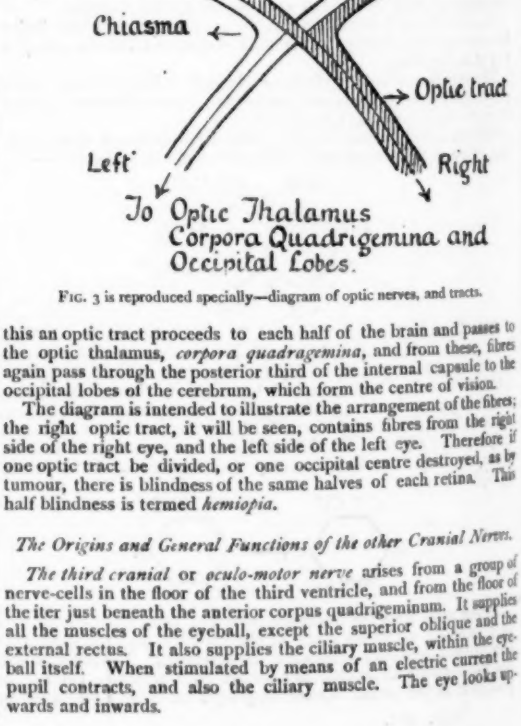


FIG. 3 is reproduced specially—diagram of optic nerves, and tracts.

this an optic tract proceeds to each half of the brain and passes to the optic thalamus, *corpora quadragemina*, and from these, fibres again pass through the posterior third of the internal capsule to the occipital lobes of the cerebrum, which form the centre of vision.

The diagram is intended to illustrate the arrangement of the fibres; the right optic tract, it will be seen, contains fibres from the right side of the right eye, and the left side of the left eye. Therefore if one optic tract be divided, or one occipital centre destroyed, as by tumour, there is blindness of the same halves of each retina. This half blindness is termed *hemiopia*.

The Origins and General Functions of the other Cranial Nerves.

The third cranial or *oculo-motor nerve* arises from a group of nerve-cells in the floor of the third ventricle, and from the floor of the iter just beneath the anterior corpus quadrigeminum. It supplies all the muscles of the eyeball, except the superior oblique and the external rectus. It also supplies the ciliary muscle, within the eyeball itself. When stimulated by means of an electric current the pupil contracts, and also the ciliary muscle. The eye looks upwards and inwards.

The fourth nerve arises from a group of cells just behind that of the third. It supplies the superior oblique muscle.

The sixth nerve supplies the external rectus, and arises from the flow of the fourth ventricle.

The fifth or *trigeminal nerve* has a most extensive origin, inasmuch as it represents the sensory roots of all the cranial nerves from the third to the twelfth. There is a motor root, however, which unites with the sensory portion, and the latter has a ganglion (Gasserian) upon it, like an ordinary spinal nerve. Each nerve divides into three branches, called opthalmic, superior maxillary, and inferior maxillary nerves. The motor fibres enter the inferior maxillary to supply the muscles of mastication. The inferior maxillary nerve also sends off the gustatory nerve, which is one of the nerves of taste to the tongue. The sensory branches supply the whole of the face, including the mouth and the nose. The fifth is also said to contain *trophic* or *nutrient* fibres. When the fifth is divided within the skull, after a time the cornea begins to ulcerate and it is finally destroyed. By carefully protecting the cornea from dust and the like, these destructive changes may be prevented. In all probability the results are due, not so much to the existence of special trophic fibres, but to the fact that the cornea has lost its sensibility, and particles of dust do not cause any sense of discomfort, and are therefore not brushed off by the eyelids as under normal circumstances. In all probability the gustatory fibres, already mentioned, reach the fifth from the glossopharyngeal nerve.

The facial nerves supply the muscles of expression. One branch, the chorda tympani, contains fibres, which when stimulated cause a secretion of saliva from the submaxillary and sublingual glands, and and a dilatation of the blood-vessels of these glands. These fibres of taste in the chorda tympani also spring originally from the glossopharyngeal nerve.

The auditory nerves arise from three pairs of nerve-cell groups in the lateral part of the floor of the fourth ventricle. The fibres pass to the cochlea and the semicircular canals.

The glossopharyngeal nerve arises from a nucleus or group of nerve cells in the fourth ventricle just anterior to that of the vagus. It is a nerve of sensation for the root of the tongue, the soft palate, pharynx, etc., and a nerve of special sense (*taste*) to the posterior third of the tongue. It contains motor fibres also, which pass to certain muscles of the pharynx, but these fibres enter it from the facial nerve in its course from the brain to the pharynx.

The tenth, vagus, or *pneumogastric nerve* arises from the floor of the fourth ventricle, and is soon joined by a branch of the spinal accessory (accessory branch). It is a mixed nerve.

Motor fibres pass to the muscles of the larynx, to the heart (inhibitory), to the muscular walls of the œsophagus, stomach, and intestines. One of the branches to the heart is called *depressor*, since when stimulated there is a great fall of blood-pressure, due to dilatation of the abdominal arteries. Some fibres pass to the lungs to supply the unstriped muscles of the bronchi, while others are inspiratory nerves. When both vagi are divided in the neck of a rabbit, respirations become very slow and deep. After division, in most animals, the heart begins to beat more quickly. Stimulation of the central end of the divided nerve quickens respiration again. If the stimulus be increased in strength the diaphragm passes into an inspiratory spasm.

The Spinal accessory is purely motor. One portion joins the vagus; the other supplies two muscles of the neck, sterno-mastoid and trapezius.

The Hypoglossal nerves arise from a nucleus in the floor of the fourth ventricle, and supply the muscles of the tongue, the muscles passing from the hyoid bone to the tongue.

The more Important Functions of the Medulla Oblongata.—The medulla presides over the most important of the bodily functions. It contains the respiratory centre, which is a portion of the centre for the vagi. Destruction of this centre produces instant death. The respiratory centre acts automatically, that is, self-acting; but its activity is dependent on the condition of the circulating blood, in such a way that the more abundantly it is supplied with arterial blood the less active are the respiratory movements, and *vice versâ*. The medulla also contains the *general vaso-motor centre* for the whole of the blood-vessels. This is a great constricting centre Section of the spinal cord in the neck which causes dilatation of vessels and lowering of blood pressure. The normal state of contraction of the arteries of a healthy part is called tonus, and this tonus is maintained by the constant activity of this constricting centre. Besides these two centres, the medulla contains a centre which, when stimulated, stops the heart (*inhibitory centre*), a centre for swallowing, vomiting, for the secretion of saliva, and the movements of phonation and articulation.

The medulla also acts as a conductor of impulses from the brain to the spinal cord, and *vice versâ*. The anterior pyramids contain motor fibres, which cross from one side to the other, and these come from the motor centres in the cortex of the cerebrum.

The Localisation of Function in the Cerebral Cortex.

During the course of the Franco-Prussian war of 1870 it was discovered by two Prussian surgeons that certain portions of the cortex of the cerebral hemispheres are sensitive to the interrupted electric current, and that particular movements are called forth when certain parts are thus stimulated. In 1872, Ferrier took up the subject, confirmed, and considerably amplified these facts. After it was found impossible to deny the correctness of these statements, a vigorous attack was made on the method itself, and it was asserted that the effects are not due to the stimulation of the cortex at all, but to the conduction of the electric current to the basal ganglia, and especially to the corpora striata. A single new fact, however, upset the opponents completely, and this was one discovered by François-Franck, of Paris, viz., that under certain circumstances, as when the cortex is itself inflamed, mechanical stimulation *alone* of certain parts produces similar muscular movements. Moreover, other facts have fully established this conclusion. For example, when a dog is deeply anæsthetised, the cerebral cortex is paralysed, so to speak, and electrical stimulation produces no effect, but it is then only necessary to remove the thin layer of grey matter, and the white matter beneath still responds, and if these results were simply due to diffusion of electric current, the grey matter should have responded as before. Moreover, the muscular movements invoked by stimulation of the grey and white matter differ from each other considerably. We can therefore dispose of the assumption and assert confidently that the grey matter of certain areas is itself excitable. From an anatomical standpoint we should hesitate to emphasise the fact of localisation of function, since on section the nerve fibres appear to run in all directions, and to form an indefinite and unintelligible network. Each fibre represents the conduction of impulses, so that each area of the cortex must stand in wide relation with adjoining areas. In other words, the brain forms a complicated felt-work. Nevertheless, as we shall see, the cortex of the brain can be mapped out into definite areas, and particular functions may be assigned to each of them. There are three methods of determining the function of the separate parts of the cortex.

(*a*) *The Electrical Method.*—This is accomplished by placing two electrodes (in connection with the secondary coil of an induction machine) very close together—one quarter of an inch or less—upon the surface of the cortex, then sending an interrupted current through this limited space, and noting any movements which follow. In this way it has been found that the parts in front and behind the fissure of Rolando are motor centres in the true

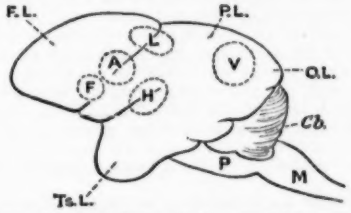


FIG. 4.—Diagram of monkey's brain; F. L. Frontal lobe; Ts. L. Temporo-sphenoidal lobe; O. L. occipital lobe; Cb. cerebellum; The letters A and L, lie over the fissure of Rolando; F, centre for muscles.

sense of the word. Proceeding from below towards the vertex we can thus map out centres for the muscles of the face, then for the arm and leg, and finally the muscles of the trunk. At the lower part, near the centre for the muscles of the face, lies the *centre for speech*, and this, in right-handed people, is on the left side. The impulses starting from the cortex pass along nerve fibres down to the internal capsule, through the crus cerebri, from vaudin and medulla. In the latter they cross to the opposite side, and run partly in the anterior columns, but chiefly in the lateral columns of the spinal cord, and pass out by the anterior roots of the spinal nerves to the muscles. Such is the tract of *voluntary* impulses from the cortex to the muscles.

(*b*) *The Method of Ablation*, or removal of certain areas in the cortex. In the monkey, removal of an area is followed, after recovery, by paralysis of the muscles represented in that part of the cortex.

(*c*) *The Results of Disease* (Pathology).—This is shown by the effect of injuries and disease (tumours) of the areas in question. These three methods all agree in demonstrating the fact that motor centres exist in the convolutions we have already mentioned.

The Sensory Centres of the Cortex.—When in an adult animal the occipital cortex is destroyed there is a tract of degenerated fibres leading from the occipital lobe through the posterior part of the internal capsule, optic thalamus and corpora quadrigemina. If this portion of the cortex be destroyed in a young animal, the optic

tracts and optic nerves atrophy also. In man a tumour, abscess, or softening of one occipital lobe is followed by hemiopia, and in some cases word-blindness is induced, especially if a portion called the angular convolution which lies a little in front of the occipital lobe be involved. The patient can see the difference between light and shade, and may identify objects, but cannot read.

The Centre for Hearing lies in the temporo-sphenoidal convolution, and the evidence for this lies in the fact that electrical stimulation produces sudden retraction or elevation of the ears—the animal pricks up the ear of the opposite side, and the head and eyes also turn. These phenomena resemble the sudden start and look of surprise caused when a loud sound is made on the opposite ear. In other words, they are signs of a *subjective* auditory sensation. There is a case recorded of a man who had been deaf for 30 years, and after death the brain was found normal with the exception of great atrophy of this part of the brain, and this was especially marked on the left side.

Hemiplegia and Aphasia.—If there should be a rupture of a blood-vessel in the internal capsule or certain parts of the motor area of the cortex, if the man survive, there may remain paralysis (*hemiplegia*) of the muscles of the opposite half of the body, and if the left cortex be involved, loss of speech (*aphasia*) is added to the loss of muscular power.

The Maintenance of Equilibrium and its relationship to the Semicircular Canals.

The maintenance of equilibrium depends upon a number of reflex acts, which again are dependent on certain afferent impulses passing to various collections of nerve cells in the grey matter, and thence reflected to the muscles through efferent channels. The chief of these afferent impulses undoubtedly are those from the eyes, the skin, the semicircular canals, and the muscles themselves. In a certain disease termed *locomotor ataxy*, there is anæsthesia of the skin of the feet, and when the patient stands, if the eyes be closed, there is great reeling; in fact, if unsupported, the patient will fall. And such patients are helpless in the dark, thus illustrating the value of visual impulses. The giddiness produced by looking down from a great height, or from looking at rapidly moving objects, is due to unusual visual impulses interfering with the maintenance of equilibrium. The semicircular canals (see chapter xiv. of Author's Text-book) lie in three planes at right angles to each other. If the horizontal semicircular canal in the pigeon be divided, the head begins to oscillate in a horizontal plane, and the bird may fall. After destruction of all the canals the animal can neither stand nor fly. After some months the animal recovers and learns, gradually, to guide his movements by sight and touch only. But if the eyes are bandaged, all the restlessness and powerlessness return. The central organ of the nervous system where these afferent impulses are received appears to be the cerebellum, and this part of the brain is connected with the rest of the brain by what are termed its superior, middle, and inferior peduncles or roots. Certain fibres from the eyes and from the semicircular canals pass in the superior peduncles to the cerebellum, and by means of the inferior peduncles the cerebellum is placed in relationship to the body and limbs.

On microscopic examination of a portion of the plaited and folded cortex of the cerebellum, there is an external layer of grey matter and a central white. In the grey there are two layers, the outer consists of many branched fibres, the inner is a granular layer composed of granules made up of a nucleus surrounded with protoplasm and with processes forming a network. Between the two layers is a layer of large flaskshaped nerve cells (the layer of *Purkinje's* cells), with one unbranched process passing down into the white substance to become a nerve fibre.

Function.—Luciani, an Italian physiologist, has removed the cerebellum in dogs, and was able to keep them alive for some months. He then found that certain movements are impossible. For instance, the animal might be able to swim, but could not land on reaching the bank. Disease of the cerebellum in man, gives rise to what is termed cerebellar ataxy. The gait is reeling, like that of a drunkard. The patient sways from one side to the other, easily overbalances himself, crosses his legs to regain his balance, and, more often than not, falls in the attempt. The eyeballs often oscillate backwards and forwards (*nystagmus*). Electric stimulation of the cerebellum also gives rise to disorders of movements. If the posterior part be excited, the head tends to fall backwards, and the heels to fly into the air. Every form of active muscular exertion therefore requires the simultaneous co-operation of a great number of movements in order to secure steadiness and to maintain equilibrium. The mechanism of adjustment appears, therefore, to be in the cerebellum, and it plays its part quite independently of consciousness. After the cerebellum is removed, the animal can, to some extent, in the course of time, substitute this power of adjustment by a conscious effort. This explains the fact of the early fatigue which supervenes in such animals. Movements formerly easy and automatic are now performed with great difficulty.

The Mode in which the Fœtus is Nourished.

The human ovum is a minute spherical mass of soft granular protoplasm containing minute globules, and imbedded in one of the follicles of the ovary. It is invested by a membrane—the zona pellucida—and contains a germinal vesicle (nucleus), and within this the germinal spot (nucleolus). The diameter is about $\frac{1}{175}$th of an inch. Fertilisation induces a series of marked changes in the ovum. The latter becomes fixed in the uterus. The mucous membrane of the latter again becomes much thickened (decidua), and grows around, completely enclosing it, so that at first the ovum derives its nourishment from the mucous membrane of the uterus. About the eighth week, a new structure, called the placenta, becomes developed, and this forms the means of communication between the fœtus and the mother. It has a most complicated arrangement, but, described generally, it consists of two parts—one, the fœtal, and the other the maternal, part. In the maternal part there are large sinuses or hollows, into which small vascular processes (belonging to the fœtus), called *villi*, project. The blood vessels of the villi run to and from the fœtus, along the interior of a connecting cord, called the umbilical cord. There is, therefore, an interchange of material in the placenta between the villi and the blood of the maternal sinuses already mentioned, and this is of such a nature that CO_2, urea, etc., pass out of the blood of the villi into the blood of the mother, and in exchange oxygen, albumin, sugar, etc., pass to the fœtus. In other words the placenta is an alimentary, an excretory, and a respiratory organ for the fœtus.

The Main Features of the Fœtal Circulation.

Oxygenated blood leaves the placenta by several vessels, which unite to form one large vein. This runs in the umbilical cord and enters the fœtus at the umbilicus or navel, hence it is termed the umbilical vein. After it has entered the body, it sends one branch back to join the inferior vena cava, and the latter passes to the right auricle. The heart of the embryo has four cavities, but the right and left auricles communicate by means of an opening called the foramen ovale, and the blood, which reaches the right auricle from the inferior vena cava is directed by a fold of membrane (Eustachian) right into the left auricle. From this it goes to the left ventricle and thence to the aorta, and is mainly distributed to the head and arms. Blood from the head and arms is carried back by the superior vena cava to the right auricle, and thence passes into the right ventricle and pulmonary arteries. Now the lungs are not yet expanded, and very little blood reaches them, but the pulmonary artery communicates with the aorta (at a point below where the carotid and subclavian arteries leave it) by means of a small duct, the ductus arteriosus, and this carries the blood to the aorta, which again conveys it to the body and lower limbs. Two branches leave the aorta and carry the impure blood through the umbilicus back to the placenta. These are called hypogastric arteries. At birth the placenta leaves the uterus soon after the child is born, the hypogastric arteries and umbilical vein become closed, and the foramen ovale closes on the second or third day. The pulmonary arteries carry blood to the lungs, which become inflated more and more with each inspiration. The ductus arteriosus between the pulmonary artery and the aorta closes, and the proper circulation becomes established by the third or fourth day.

The Lacteal Glands and Lactation.

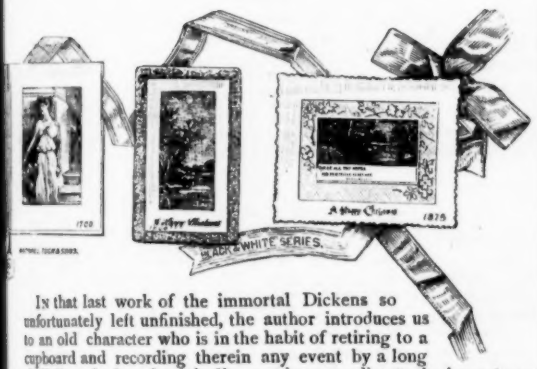
For the first few months of life the child is usually nourished on the secretion of the mammary glands of its mother. The active formation of milk begins about the third day of the child's existence. The first milk secreted is called the *colostrum*. It contains less casein and fat, but more albumin than the milk secreted afterwards.

The mammary glands consist of small lobules collected into lobes, and united by connective tissue and blood vessels. The smallest lobules consist of a number of rounded vesicles or alveoli from which proceed the ducts. These unite to form larger ducts, and the largest open at the nipple. When at rest, that is in the gland of a non-suckling woman, the vesicles are few, and filled up with masses of irregularly shaped cells filled with granules. But when in activity, as after child-birth, the vesicles increase in size and number, and the cells become more numerous. When the secretion of milk commences on the third day, the cells begin to form in the interior fat globules, and then disintegrate, discharging the fat globules into the lumen, along with sugar and albumin, which pass along the ducts to the nipple as milk.

Milk *microscopically* contains a great number of minute spherical fat globules. The chief constituents of human milk are *proteid*

(casein and albumin), *fats* (palmitin, olein, etc.), *sugar* (milk-sugar), and *salts* (phosphates of calcium and magnesium, sodium chloride). The constituents are derived from the blood, and the lymph in which the vesicles are bathed. The three chief ingredients, *casein*, *lactose*, and *fat*, are manufactured by the cells of the mammary gland itself from the lymph. Casein and milk-sugar are found in no other place in the body. The proof that the fat is formed by the cells of the vesicle is shown by the fact that when a dog is fed on pure proteid food—meat—she excretes more fat in her milk than she takes as food, and an increase of the fats in the food does not produce any increase of the fat in the milk, but tends to decrease it.

FINE ART PRODUCTIONS.



In that last work of the immortal Dickens so unfortunately left unfinished, the author introduces us to an old character who is in the habit of retiring to a cupboard and recording therein any event by a long chalk line, the length of the line varying according to the importance of the record. In odd hours she would repair to this closet and recapitulate the whole of her diary.

It is, perhaps, in just such a way that we are led to check off events and years as they sweep over us, chalking them down in our memory. And we shall soon find necessity to draw a long chalk line across the faculty of memory, piecing off the year 1895 as something of the past. Only a few things are wanting now to seasonably bring about this lamentable issue, and one of them is Christmas cards and presents—which brings us to the subject we wish to write upon.

Messrs. RAPHAEL TUCK & SONS, Coleman St., E.C., have sent us an exquisite selection of Christmas cards and novelties. A better collection we have not seen for a long time, and for us to enumerate in detail each and all of the things submitted would be to extend our article into some half-dozen columns.

But many are of such superlative merit, both in choice of subject and excellence of design, that it would indeed be a sin to pass them over without comment. The first and most prominent feature of this year's cards is the abundance of black and white work. Messrs. Tuck have seemingly reached the acme of perfection in the production of their photogravure cards. The reproductions heading our article are among the fairest of the fair. Each of these cards is done separately. The picture is a specially stamped proof mounted on a simply embossed card of a happy grey tint, gold stamped. Another, on a cream-coloured four-fold card, bearing words inside, a neat silk bow holding the leaves together. Several larger cards are of most pleasing appearance; one, for instance, showing four hunting pictures,—'The Meet,' 'A Good Start,' 'The Last Fence,' and 'The First In'—all on an oblong light grey card, with a neatly stamped border. Such cards are well worthy of a frame. Amongst others, several classic figures, or three miniature animal subjects as a single card, are worthy of note. Next we have a tastefully coloured card entitled 'The Festive Hours Screen.' This is one of those productions that always seem fresh to the eye; they are ever pleasing. Three little boys are dancing with three bonny partners. The children are wearing purple and mauve dresses stamped with gold, bells are ringing overhead, and a twig of mistletoe is discernible; it is three-folded at the sides and suitable for a drawing-room table; when the lapped sides are pulled out a very pretty effect is obtained. The groundwork is cream with a slight suspicion of pink. Of the special cards in boxes that reflect much credit on the producers, the best is an irregular oval-shaped card with a branch of ivy running round it. A window is half open showing silvered lattice work; several birds are passing before it, and old variegated ivy leaves hang down the front of the wall. The two inside pages bear gold lettering and rhyme; there is also a place for an autograph, the whole being held together by corded silk. Similar is a pretty old farmhouse with bees, such pastoral subjects rarely failing to put in an appearance.

We notice many decorations for the home, some to hang by silk ribbons, and others cleverly folded to allow of their being stood on a table.

The former class are mainly composed of calendars, the prettiest of which is the 'Sunny Days Calendar,' composed of a series of twelve pale blue slips, each one decorated with a few birds in flight, from the swallow to the bullfinch; the ends of the slips are cut lattice work interspersed with forget-me-nots. Each of the slips has a month's dates gilded on, and a line from some great thinker. Pinned on the wall, a very pretty effect is obtained.

Another fine art calendar is the 'Oliver Wendell Holmes.' Each sheet of colour-work bears some beautiful flower, a quotation from one of Holmes's works, and a small calendar for the month, all held by light blue silk cord, and the whole in a neat little box. 'Our Kitty' is as pretty as comical. A pussy-cat, standing about a foot high, resting on its two front paws, bears a bell round its neck, the bell being a tear-off calendar for the coming year. The head is fitted into a slot, and a pendulum attached to the end causes it to nod to and fro after the toy-donkey fashion.

The 'Every Dog Has His Day Calendar' is prodigious. A large tambourine has attached round its edges twelve dogs' heads. The dogs vary in character, in fact every dog is different, and each has a name given him in accordance with his nature. Thus, the pug is 'the conceited dog,' the terrier 'the popular dog,' and so on. A small pin holds the heads, which, when turned round, leave a gold-printed calendar to view. A big St. Bernard is printed on the middle of the tambourine.

The children's novelties are the next feature in Messrs. Raphael Tuck's exhibits. No doubt exists in our minds, in spite of the good show, as to which will excite the most popularity. 'Gentle Gladys' holds the field. Why 'gentle' we cannot tell, but we presume the title is merited by her silent submission to the process of dressing. To introduce you, Gladys is a dainty little cardboard doll *en déshabille*, with an outfit of six gorgeous gowns which, by a simple arrangement, can be fitted on her. Hours of amusement can be derived by dressing her with one kind of hat and another kind of gown.

'The Animals Walked in Two by Two,' as one might guess, is a box full of animals. The box is in the shape of half an ark, and the inside is full of animals in twos—two elephants, two horses, two dogs, etc., etc., all in cardboard and well coloured.

One of the finest examples of embossed chromo-lithographic work is the 'Whole Picture Gallery,' a dozen large figures highly coloured and made to stand—the huntsman, the postman, Father Christmas, and many well-known characters in sport and daily life. These make a decoration for the home. Messrs. Tuck tell us they have given the most lavish consideration to their booklets, and we cannot help but believe them. In 'Home, sweet Home,' the stamping and embossing is arranged to a nicety. Two birds sit on the bough of an apple-tree surrounded by apple-blossom. The first page is for the autograph of the sender, and the remainder contain the poem 'Home, sweet Home, with music, and another well-known piece of verse. Several picture-books for children at cheap prices are nicely coloured—and here it will be well for us to call attention to an important fact: throughout the whole of their toy books, novelties, and picture-books, Messrs. Tuck have paid great attention to the educational element. In all they have done in this line, a perfection of drawing, a trueness of colouring, and a general tendency to train the young idea has been exhibited. Teachers, please note. 'Father Tuck's A B C of Birds,' 'Holiday Revels,' and the 'Little A B C Lessons' are amongst the instructive, artistic, and cheap books.

Lastly, we come to the ordinary-sized Christmas cards. With the increase of trade these fine-art publishers obviously increase the quality of their goods, and the cards before us are of the highest degree of excellence. Here it is that we meet some of our old black and white friends, appearing on the bigger cards, mounted with evident thought and consummate taste. Some of the platinotype, photo-

gravure, and collotype illustrations are seemingly from life. Such scenes as three fisher-girls paddling, gipsies round a fire, and other life-like pictures, look too natural for brushwork. Four-fold cards, tied with silk cord or ribbon, are in abundance, and black and white pictures on white crinkled paper. An old-fashioned card on hand-made paper looks quaint and good. The subject, a young lady, is dressed in the old-fashioned style, with ringlets and prominent hair-comb. The beauty of the card lies in its simplicity.

Of colour cards, which, as Messrs. Tuck say, are and will be always in the ascendant, the best is an oblong card, to open; a small round, of about the size of a five-shilling piece, forms a pretty little centre picture; round this the card is cut and silvered, the remainder of the front is floral work, and 'Remembrance' looks most refreshing in moss, the whole appearance being soft and warm.

In short, there is colour, beauty, delicacy, and taste in abundance, and variety everywhere.

Some cards will cause an involuntary exclamation of pleasure, while others require a more æsthetic and critical eye to distingish the beauty and talent exhibited. But we can, and do, conscientiously affirm that in picture-books, in novelties, in almanacks, and in cards, there is not, among the quantity sent to us, one single production without merit, taste, or beauty.

BRADFORD SCHOOL BOARD.

SCHOOL ATTENDANCE IN THE FOLLOWING TOWNS:—

Towns.	Percentage of Average Attendance in all Public Elementary Schools.		Percentage of Average Attendance in all Public Elementary Schools, except Infants.		Percentage of Population on Registers of Public Elementary Schools.	Percentage of Number of Half-timers to total Number on Registers.	Number of Half-timers.
	Actual Percentage of average Attendance to Number on Registers.	With Allowance for Half-timers.*	Actual Percentage of Average Attendance to Number on Registers.	With Allowance for Half-timers.*			
Leicester	87·7 (1)	88·8 (1)	89·3 (1)	91·0 (1)	18·9 (7)	2·4 (20)	870 (20)
Hull	87·1 (2)	No Half-timers (2)	No Return (5)	No Return (6)	18·6 (11)	Nil (1)	Nil (1)
Leeds	86·6 (3)	86·7 (3)	88·8 (2)	89·0 (3)	18·7 (9)	0·2 (13)	194 (12)
Newcastle	86·3 (4)	No Half-timers (4)	87·1 (6)	No Half-timers (7)	15·4 (25)	Nil (2)	Nil (2)
Liverpool	86·2 (5)	No Half-timers (5)	87·4 (4)	No Half-timers (5)	18·3 (15)	Nil (3)	Nil (3)
Sunderland	85·8 (6)	No Half-timers (6)	86·1 (8)	No Half-timers (10)	19·1 (5)	Nil (4)	Nil (4)
Sheffield	85·5 (7)	85·7 (7)	86·5 (7)	86·7 (8)	18·7 (10)	0·3 (14)	About 250 (14)
Birmingham	85·01 (8)	85·02 (8)	85·01 (9)	85·02 (13)	17·6 (17)	0·01 (7)	16 (10)
Norwich	84·91 (9)	84·93 (10)	85·00 (10)	85·02 (14)	19·4 (4)	0·04 (9)	9 (7)
Nottingham	84·4 (10)	85·0 (9)	No Return (11)	No Return (15)	19·8 (3)	1·4 (18)	625 (19)
Derby	84·11 (11)	84·16 (11)	84·87 (12)	84·96 (17)	19·9 (2)	0·1 (12)	26 (11)
Portsmouth	82·8 (12)	83·1 (14)	84·7 (13)	85·2 (12)	16·7 (20)	0·6 (15)	200 (13)
Bristol	82·70 (13)	82·71 (15)	82·69 (15)	82·71 (20)	17·1 (19)	0·03 (8)	13 (9)
Huddersfield	82·3 (14)	83·2 (13)	88·2 (3)	89·7 (2)	16·1 (23)	2·2 (19)	350 (15)
Birkenhead	82·2 (15)	No Half-timers (16)	83·4 (14)	No Half-timers (19)	16·4 (21)	Nil (5)	Nil (5)
Salford	81·0 (16)	81·4 (20)	No Return (17)	No Return (21)	18·5 (12)	0·9 (17)	361 (16)
Manchester	80·1 (17)	80·3 (21)	No Return (20)	No Return (24)	18·8 (8)	0·6 (16)	About 600 (18)
Cardiff	80·0 (18)	No Half-timers (22)	80·1 (22)	No Half-timers (25)	18·4 (14)	Nil (6)	Nil (6)
London	79·82 (19)	79·85 (23)	80·35 (19)	80·39 (23)	16·4 (22)	0·06 (10)	493 (17)
Bradford	79·3 (20)	83·6 (12)	80·2 (21)	86·5 (9)	17·8 (16)	10·3 (23)	4193 (25)
Brighton	79·15 (21)	79·17 (24)	80·49 (18)	80·53 (22)	15·9 (24)	0·06 (11)	About 12 (8)
Bolton	78·5 (22)	81·7 (19)	82·4 (16)	87·7 (4)	21·8 (1)	7·7 (21)	2042 (21)
Blackburn	76·0 (23)	81·9 (17)	75·4 (25)	85·0 (16)	19·1 (6)	14·2 (24)	3491 (24)
Halifax	75·4 (24)	81·8 (18)	75·8 (24)	85·5 (11)	17·3 (18)	15·5 (25)	2502 (23)
Oldham	74·3 (25)	77·7 (25)	78·6 (23)	84·2 (18)	18·5 (13)	8·6 (22)	2242 (22)

* The allowance for Half-timers is made by deducting one half of the Half-timers from the total number on roll, and dividing the remainder into the average attendance multiplied by 100.

PRIZE BOOKS.

THE OXFORD UNIVERSITY PRESS WAREHOUSE.

From the above firm we have received an OXFORD BIBLE for TEACHERS, printed on India paper, in ruby type, with a central column for references, and containing, in addition, voluminous notes, a dictionary, an account of recent discoveries, a Bible index, a concordance, maps, etc.—in fact, and in short, *everything*. Of the many Bibles we have received from Messrs. Frowde at different periods, this one, for compactness and neatness, certainly holds first place. After carefully scrutinising the volume, we confess that there is not a feature in the whole book that will lend itself to adverse criticism. It has been, pre-eminently, the wish of the publishers to combine a handy, neat, and useful volume, with clearness and distinctness of type. They have succeeded, probably, beyond their own expectations. The miscellaneous information compiled at the end of the work is a little library in itself, and to teachers such supplementary information will be doubly welcome. It would take too much of our space to enumerate this additional matter. One can only wonder how so many subjects can be included in such a limited amount of space; and when we look at the letterpress, and note its clearness, we wonder still more how it is done. The number of Bibles is legion, but the number of such as this is one; it is a *chef-d'œuvre*, and would make a beau-ideal present in every respect.

MESSRS. T. NELSON AND SONS' LIST.

A Lost Army: A tale of the Russians in Central Asia. By Fred. Wishaw.

The story opens with the Tsar Peter in England, where he takes a violent liking to two small English boys. He prevails upon their father to have them trained for the Russian service, on condition that they shall never be called upon to take arms against their own countrymen. The fortunes of Tom and Jack Gregson are followed in the story, which gives a thrilling account of the Russian defeat in the East. The character of the Great Peter is life-like. The book is a capital one, and deserves our best and heartiest recommendation. It is also one of the handsomest prize books of the season.

Norseland Tales. By H. H. Boyesen.

These are delightful and varied short stories. This author excels in Norseland tales. Whoever has read his previous productions will be in no wise disappointed with these. All are excellent; indeed, if anything, we should say the last comes first.

In Far Japan. By Mrs. Isla Sitwell.

An entertaining little story of English child life in Japan. It is brightly written, and gives a good idea of the customs of Japanese daily life. There are several capital pictures in the book.

The Secret Cave: or, The Story of Mistress Joan's Ring. By Mrs. Emilie Searchfield.

This is a charming historical tale for children. The story is of the year 1685, the time of the Battle of Sedgemoor, when unrest and trouble were in hundreds of English homes. Mistress Joan was only a little maiden, but of true English heart. By her courage and faithfulness she managed to do good service to her father and his lord.

Tuck-Up Songs. By Ellis Walton.

A book full of pretty songs and pictures for the little ones. It is bound in colours, and exceedingly attractive.

Tommy at the Zoo. Pictures by J. A. Shepherd. Verses by Rev. A. S. M. Chester.

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With Claymore and Bayonet. By Lieut.-Col. Percy Groves, R.C.A.

Alan M'Ivor is the hero of this interesting volume. By an accidental meeting he is enabled to render Colonel M'Kenzie, of Seaforth's Highlanders, some valuable assistance. In return for this he is promised a commission in the 1st Battalion of His Majesty's 78th Highland Regiment; perhaps better known as the "Ross-shire Buffs." This he readily accepts, and his regiment is almost immediately called out to Holland. Alan gets promoted in his first action; he serves in many encounters, and his career is a chequered one. After returning from captivity in France, we are allowed a rest of seven years, and when next our hero embarks, it is as a lieutenant in his old corps to India. He accomplishes some valuable service, and returns home as Captain Sir Alan M'Ivor, where, after his marriage, we leave him to "live happy ever after." The value of the story is enhanced by its being from the pen of a man well-versed in the technicalities of warfare, and we willingly believe that the numerous and interesting comrades Alan meets with are drawn from life.

The Red Terror. By Edward King.

The scene is laid in Paris during the outbreak of the Commune. The chief personages are two boys and their grandfather, the elder of the two boys being the hero. Some of the descriptions are vivid and life-like; on the whole the narrative is interesting, but we think readers of prize-books must rather tire of endless stories of Paris during rebellion, revolution, and siege.

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At the eleventh hour we have received **Cassell's Family Magazine**, but we cannot let it pass without a word of our warmest approval. It appears in a beautiful new style of binding, and the contents are more than worthy of the cover. It contains something for everybody.

For Glory and Renown: A Story of the Wars. By D. H. Parry.

This is an exciting story of war times. One of the chief features is the spiriting away of a young girl from her father's Château in Brittany. Harry Paget, an English youth, who had been at a military school in France, is the hero of the tale. After a whole series of conflicts, dangers, and victories, the story happily finishes with hero and heorine in their own English home. The book is a very attractive one, well written and full of life. It should be a favourite.

MESSRS. BLACKIE AND SONS' LIST. 2ND NOTICE.

A Thane of Wessex; being a Story of the great Viking Raids into Somerset. By Chas. W. Whistler.

The history of Heregar the Thane is full of old-world chivalry and romance. In these days of peace and luxury it is difficult for young people to realise what our forefathers had to brave and suffer. Books such as this one, that take the mind back to olden days, cannot be too much read and pondered over. In this case the task will prove one of pleasure and delight.

His First Kangaroo: An Australian Story for Boys. By Arthur Ferres.

Nevertheless, girls have a fair share in the story. Dick Morrison accepts his cousin's invitation to spend his holidays on their sheep station in the Bush. We read of the delights of hunting, shooting, etc., and of Dick's killing his first kangaroo. Nor is the element of danger wanting, for Dick has two or three sharp encounters with bushrangers, in which he acquits himself manfully. The tale is good throughout, and depicts some of the finest traits of young manhood.

The Ball of Fortune. By Charles Pearce.

For novelty of idea it would be hard to excel this little tale. Captain Somerset makes his 'pile' at the Californian Gold Fields. In order to carry his gold back to England safely he has it made into a cannon-ball. The adventures of the cannon-ball are numerous. Eventually, an effort is made to steal it, but the owner places in its stead a real cannon-ball, and the gold one is safely banked. It is a clever little story.

Proud Miss Sydney. By Geraldine Mockler.

'Pride is sure to have a fall,' and presumably this book is written to draw attention to the trite proverb. Miss Sydney runs away from home in order to embark for France, but Fate interposes in the form of gypsies, who rob her of all her money and part of her clothes. She returns home after some time a sadder and wiser girl.

Wilful Joyce. By W. L. Rooper.

This is one of the ordinary children's stories, venturing upon nothing beyond every-day life. Elfrida and Joyce Longford are the two little girls whose careers we follow for some time. The young folks get into several scrapes, and the accounts of how one of them went to a supposed witch to get rid of her freckles, and how they were caught by the tide, are entertaining.

The Family Failing. By Darley Dale.

We hardly know whether we can conscientiously recommend this work. The story commences in a desultory manner, and as far as we can see the family is full of 'failings.' Nor is the subject of a father's failure on the Stock Exchange a very healthy one for young folks. The characteristic failing is discontent, and this is hardly a pleasant theme to harp on continually.

The Girleen. By Edith Johnstone.

In order to avoid monotony in the many books they publish, Messrs. Blackie are compelled to adopt various colours and designs for their volumes, both big and little. This—one of the latter—is clothed in a most admirable manner, and the colour in itself will prove of infinite attraction to a juvenile æsthetic eye. The appearance of the cover in this case slightly belies the attractiveness of the story. Still, a plantation tale is rarely devoid of interest, and this one is no exception to the rule.

In the Days of Drake. By J. S. Fletcher.

Mr. Fletcher's book is undoubtedly very late in the field. If all the books dealing with Franky Drake and his men were considered *en masse*, the probability is that we should find enough matter to account for every day of Drake's life, and perhaps a year or two extra thrown in. Of these, 'Under Drake's Flag,' by Mr. Henty, ranks first, and among the minor lights we would place Mr. Fletcher's small volume. The diction is old, the tale is old; but the book is only 2s., and well within reach of youngsters to whom Drake is as yet a hero by hearsay.

Uncle Jem's Stella and **The Little Girl from Next Door** are both beautiful little volumes, tastefully compiled. It is noticeable that present-day authors do not confine themselves to a limited vocabulary; we do not know whether young folks can read all this, for it is a long time since we were young—if they can, all the better.

Two Gallant Rebels. By Edgar Pickering.

Anything with an element of the mysterious in it will inevitably excite the interest of lads. Smugglers, runaways, stowaways, and all such topics prove of unfailing interest. The book before us is no exception to the rule. We are introduced to Rupert Ogilvie, who gets implicated in some smuggling transactions and has to go to Holland, and here we meet Claude Oglander, who becomes his friend. We are kept in the company of these two throughout the tale, which abounds in anecdote and adventure.

This year we fancy there is a scarcity of girls' books, so that the new edition of **Cousin Geoffery and I**, by Caroline Austin, should meet with a warm welcome.

We also are glad to see a new edition of that capital story **Hussein, the Hostage**, by G. Norway.

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In the Lion's Mouth: The Story of Two English Children in France, 1789–1793. By Eleanor C. Price.

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The Carved Lions. By Mrs. Molesworth.

A pretty children's story. The lions, huge Indian curiosities, stand in a shop frequented by Geraldine and her brother. The childish troubles and joy, real or imaginary, somehow all seem mixed up with the lions—busy fancy plays so large a part in child-life. A very natural and entertaining little tale.

The Second Jungle Book. By Rudyard Kipling.

This is one of Messrs. Macmillan's artistic and well-bound six shilling books. 'Decorations by J. Lockwood Kipling' is right; they can hardly be termed mere illustrations. The pretty little headings for the tales, and the pretty little finishes, are nothing less than an ornamentation to the volume. The stories are well-told, and, we believe, founded on fact. The book is a welcome addition to the valuable series.

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The Two Altheas: A Home Chronicle. By Edith E. Horsman.

To quote from the preface, 'houses are built, but homes are planted and grow.' This is the kind of book to make our girls look for happiness at home. It is well worth reading, and a most desirable present for elder girls or young teachers. We strongly advise its purchase, and trust that 'The Two Altheas' may find a home on many bookshelves. In outward appearance it is handsome and serviceable.

The Minister. By L. T. Meade.

A touching little story of real life. The minister's wife, to earn sorely needed money, writes some sarcastic sketches which are readily accepted and paid for. This action, however, stirs up strife in the Church, and we have the history of Helen's trials and sorrows, and her brave struggle to keep worries from her husband. It goes without saying that Mrs. Meade's stories are always good.

NATIONAL SOCIETY'S LIST.

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A tale of rural life. The family of Carbonels take up their residence in a village, the people of which are described as 'a bad lot.' By gentle patience, kindness, and deeds of charity, in time they work wonders, and the villagers themselves confess that the result is surprising. The volume is very tastefully got up, and will make an excellent gift for a girl.

Dorothy's Stepmother. By Penelope Leslie.

A little story telling of a sweet young stepmother, who brings sunshine into the hitherto joyless life of Dorothy.

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This little book contains a story from humble life. Tom Green, a poor little fellow, has the true artist's love for his work. From drawing pavement pictures he rises to eminence.

Two Maiden Aunts. By Mary H. Debenham.

The two aunts are only young girls, but they determine to do their duty by the little orphan nephew committed to their charge. They succeed beyond their expectations, and Godfrey lives to thank his young aunts for his manly and upright qualities. As old Kirk puts it, 'A man serves king and country better for having the right sort o' women folks at home.' A girl's book of the very best kind, is our verdict on 'Two Maiden Aunts.'

The Puff of Wind. By Frederick C. Badrick.

A bright, well-written little story of stage-coach days. Very suitable for a Christmas gift-book.

The Story of the Cat and the Cake: During the Thirty Years' War. Told by Hans Gyrer of Nuremberg to his grandchildren. By M. Bramston.

A delightful story of Bohemia when it was a separate kingdom, and owed allegiance only to Germany. The story teems with instruction about German manners and style of life a couple of hundred years ago. The cake is a medium for conveying secret papers; and its fate will be followed with intense interest by those who are fortunate enough to get the chance of reading its history.

The 'Story Hunter: or Tales of the Weird and Wild. By Ernest R. Suffling.

A clever, fantastic book after the style of Jules Verne. It is something quite out of the common line. The story hunter gets his tales through the medium of what he calls 'brain-ether,' a species of thought-reading or brain telegraphy. Dead skulls come under this curious imaginary influence, and the book gives some startling results. It is well worth spending an hour over, and will be a source of real recreation.

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imagine a child of any refinement caring to read that 'Jack walked off ringing "Daisy, Daisy,"' etc.; or that, 'The giant put on his trousers, it was like putting his legs into two factory chimneys'; or even that Cinderella's father expressed himself thus, 'Grammar be blowed; a man can eat and drink without grammar, and that's the main operation'; or thus, 'We're having quite a purple time of it, aren't we old boy? quite a purple time of it; a slap-up royal sling; regular purple proceedings, eh.' And these are the days of higher grade education!

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REVIEWS.

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Mr. Forbes throws no veil over the horrors which, alas, gather thick about the deeds of glory done on the battle-field; and he is of opinion that in the next great war the respect which has in recent wars been shown to the wounded, will give place almost of necessity to neglect and disregard, that *vae vulneratis* will become the watchword and indicate the policy on this matter in future conflicts. But even in this horrible forecast which his experience and great knowledge lead him to form, he sees a gleam of hope. 'Stern experience of future warfare,' he says, 'will one day, please God, force home upon the nations the decision whether their wounded and necessarily untended warriors, in their thousands and their tens of thousands, are to lie bleeding on the battle-fields while the strife is raging above them, or whether the peoples of the civilised world shall take the accomplishment of the blessed millennium into their own hands and bring it about, in the words of the old Scotch paraphrase, that—

> 'No longer hosts encountering hosts
> Shall crowds of slain deplore;
> They'll hang the trumpet in the hall
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University Extension Manuals. Latin Literature. By J. W. Mackail. London: John Murray.

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For its style no less than for its matter the book deserves careful reading, for it abounds in felicity of phrase, and in aptness of illustration and comparison. After summarising in eloquent fashion the scientific teachings of Lucretius, Mr. Mackail gives us a fine translation of a very touching

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